Emerging Markets Review 60 (2024) 101131

Contents lists available at ScienceDirect

Emerging Markets Review

journal homepage: www.elsevier.com/locate/emr

Social capital and cost of debt: Evidence from Chinese CEO network centrality

Yiping Chen [a], Yuan George Shan [b,*], Jimin Wang [c], Xinxin Yang [a], Junru Zhang [d]

[a] Department of Accounting, School of Management and Economics, Shanxi University, China
[b] Department of Accounting and Finance, UWA Business School, The University of Western Australia, 35 Stirling Highway, M250 Crawley, WA, Australia
[c] Department of Accounting and Finance, UWA Business School, The University of Western Australia, Australia
[d] School of Business and Law, Edith Cowan University, Australia

ARTICLE INFO

Original content: CEO social capital (Original data)

JEL classification:
G30
D85

Keywords:
Social capital
Cost of debt
Network centrality
Mediation effect
Information asymmetry
China

ABSTRACT

Using a unique dataset comprising 6313 firm-year observations for Chinese listed firms between 2008 and 2017, we investigate the impact of CEO social capital on cost of debt. Our results show that CEO social capital is negatively related to cost of debt, and the impact of CEO social capital in environments with a low degree of marketization or social trust is more pronounced than in environments with a high degree of marketization or social trust. Moreover, our results reveal that two potential mechanisms, discretionary accruals and information disclosure quality, mediate the impact of CEO social capital on cost of debt.

1. Introduction

Research into social capital in the area of social economics emerged late last century (e.g., Coleman, 1988; Putnam, 1993, 1995; Knack and Keefer, 1997; Uzzi, 1997; Portes, 1998; Woolcock, 1998; Dasgupta, 2005; Fafchamps, 2006). Prior studies have acknowledged the significance of the personal social capital embedded in social networks for corporate commercial activities, including corporate financing (Engelberg et al., 2012; Ferris et al., 2017; Huang and Shang, 2019; Jin et al., 2019), corporate investment (Faleye et al., 2014; Fracassi, 2017), mergers and acquisitions (Fracassi and Tate, 2012; El-Khatib et al., 2015), executive employment and compensation policies (Hwang and Kim, 2009; Fracassi and Tate, 2012; Nguyen, 2012; Engelberg et al., 2013; Ferris et al., 2020), risk-taking and accounting practices (Ferris et al., 2017, 2019; Panta, 2020), and litigation risk (Zhang et al., 2023). Personal social capital embedded in social networks, especially the social capital of corporate executives, has a significant influence on corporate financing. Social capital enhances the trust between borrowers and lenders and increases risk-taking behavior as social

* Corresponding author.
E-mail addresses: chenyp710@sxu.edu.cn (Y. Chen), george.shan@uwa.edu.au (Y.G. Shan), jimin.wang@research.uwa.edu.au (J. Wang), j.zhang@ecu.edu.au (J. Zhang).

https://doi.org/10.1016/j.ememar.2024.101131
Received 2 April 2023; Received in revised form 20 March 2024; Accepted 2 April 2024
Available online 5 April 2024

capital is seen as an informal insurance. As invisible social credit and a conduit for the exchange of information, CEO social capital benefits corporate financing activities.

We are motivated to investigate the connect between CEO social capital and cost of debt due to the complex institutional background of network and the importance of debt financing in the context of China. Despite China's remarkable economic growth in recent decades, its financial and legal environments remain underdeveloped. Allen et al. (2005) suggest that in order to sustain this growth, China requires alternative governance mechanisms and informal institutional arrangements. In the Chinese context, China is characterized as a relationship-based society, where social capital embedded in social networks, known as "Guan Xi," holds significant prevalence and complexity. These networks provide Chinese additional social resources such as information and status (Song et al., 2012; Bian, 2019). For example, the CEOs and chairmen of Chinese non-state-owned firms use bank loans to raise funds through their political contacts (Yu and Pan, 2008). Loan approvals and covenants for Chinese corporates are influenced by CEO social capital (Shen et al., 2009; Xu and Li, 2016). CEO social capital is negatively associated with firm leverage and short-term debt ratio, and social capital lowers the need for corporate bank borrowing (Huang and Shang, 2019), and the social capital benefits improving the quality of corporate loans (Jin et al., 2019). These studies only reveal the impact of managerial social capital on corporate financing, while the research into the impact of CEO social capital on the cost of debt is relatively scarce, particularly in emerging markets such as China.

In Chinese firms, external financing accounts for more than 80% of total corporate financing, of which 67.10% is debt financing according to data from the People's Bank of China in 2018, and this figure remains 64.17% in 2021 (China Statistical Yearbook, 2022). As the primary avenue for financing, debt, particularly through bank loans, plays a pivotal role in fueling the development and expansion of Chinese enterprises. Management decision-making in the country is heavily influenced by considerations of debt financing capacity and the associated cost of debt (Allen et al., 2005). However, the challenge lies in the fact that enterprises do not always have access to low-cost bank loans due to the constrained financial resources of banks and the financing constraints faced by firms. Moreover, China faces significant agency problems and information asymmetry, which could impede the progress of its debt market. To mitigate this financing challenge, companies can rely on social networks to disseminate information, establish trust relationships, and gain access to additional financing (El-Khatib et al., 2015). Therefore, understanding the dynamics of the cost of debt and the role that CEO's social capital becomes crucial for strategic decision-making and firm sustainable growth. The objective of this study is to fill this research gap through the emphasis on investigating the cost of debt of firm in China is of paramount importance given the distinct financial landscape characterized by the dominance of the banking industry over the capital market (Wu et al., 2020).

We investigate three research questions. First, all else being equal in the Chinese capital market, we hypothesize that a CEO's social capital will benefit their firm's cost of debt. Second, we propose that the reduction in cost of debt related to CEO social capital will be amplified in firms located in regions with lower marketization or social trust, respectively. Third, we analyze the relationship between CEO social capital, information asymmetry and cost of debt. We hypothesize that information asymmetry mediates the relationship between CEO social capital and cost of debt, and that CEO social capital decreases the information asymmetry between debtors and creditors. To answer these questions, we draw on a unique dataset comprising 6313 firm-year observations for firms listed on the Shanghai and Shenzhen Stock Exchanges from 2008 and 2017. Our results indicate that: (1) CEO social capital leads to a reduction in their firm's cost of debt; (2) the impact of CEO social capital in environments with a low degree of marketization or social trust is more pronounced than in environments with a high degree of marketization or social trust; (3) discretionary accruals weaken the impact of CEO social capital, while information disclosure quality (IDQ) strengthens this impact; (4) the additional analyses, including the three individual proxies (betweenness centrality, closeness centrality and degree centrality) for CEO social capital, the two alternative proxies for cost of debt, sample without political capital, excess social capital, the consideration of family business characteristics, the interactive effect of state-owned enterprises and endogeneity concerns, all confirm the baseline findings.

Our study makes several incremental contributions. From the theoretical perspective, the examination of the impact of CEO social capital on the cost of debt is underpinned by a well-developed theoretical framework. We argue that organizations can benefit from the connections of CEOs because social networks can contribute inherent value. This view is supported by social capital theory, which focuses on the importance of social ties, norms, and trust in facilitating cooperation and achieving shared goals (Putnam, 2000). We then use network theory to investigate how social capital centrality within a network affects the cost of debt (Stanley and Katherine, 1994). Our results indicate that a CEO's social capital lowers their firm's cost of debt. This evidence is in contrast to the findings of prior studies, such as those of Fracassi and Tate (2012), Ishii and Xuan (2014) and El-Khatib et al. (2015).

Moreover, we incorporate information asymmetry theory to enhance the understanding of the mechanisms underlying the association between the social capital of executives and the cost of debt by considering the mediating effect of information asymmetry channels. This is supported by information asymmetry theory, which suggests that lenders may charge higher interest rates to borrowers with less transparent information, while the social capital of executives can reduce the information asymmetry by enhancing trust and credibility (Myers and Majluf, 1984). Our results verify this theory.

From the practical perspective, Fogel et al. (2018) argue that there are new aspects of networks that capture the effects of social capital among all members of a network as opposed to only those identified as having a bilateral connection, and it makes more sense to investigate the actions of individual executives based on their respective positions in the larger network of all business executives. In response to this argument, we measure the CEO social capital, while considering the multivariate network of interpersonal relationships to explore the relationship between the social capital of executives and the cost of corporate debt capital in the Chinese context. This study extends corporate finance research by incorporating this informal social mechanism.

The practical implications of CEO social capital extend to various stakeholders, including regulators, policy makers, and capital market decision makers. First, enterprises, particularly micro-, small-, and medium-sized ones in regions with low marketization and social trust levels, are advised to consider executives' personal social networks when recruiting senior management staff. Executives

possessing extensive social networks are viewed as instrumental in mitigating information asymmetry, thereby improving the likelihood of securing low-cost debt financing for their firms. Second, a positive link is identified between higher social capital among executives and enhanced quality in the firm's information disclosure. However, a cautious approach is warranted, acknowledging the potential for corporate violations associated with the accumulation of social capital by senior management. The policy recommendations underscore the importance of government intervention to establish and refine laws and regulations. These efforts should focus on bolstering social credit reporting systems, fostering a balanced development of marketization and social trust across diverse regions in China. Regulatory agencies are urged to consider executives' social networks, offering guidance to companies in navigating financing challenges and encouraging ethical use of social capital by corporate leaders.

We organize the remainder of the paper as follows. Section 2 reviews the background of social capital and establishes theoretical frameworks for hypotheses development. Section 3 shows the research design including sample and data collection, variable measurement, and model specification. Section 4 presents the results. Section 5 discusses the findings of this study and the extant literature. Section 6 concludes with implications, limitations, and suggestions for future research.

2. Background, theoretical frameworks and hypotheses

2.1. Background

According to the renowned Chinese sociologist Xiaotong Fei (1948), the fundamental basis of Chinese society is in the interpersonal ties between individuals. In contrast to the emphasis on individual authority shown in many other countries, Chinese individuals are interconnected via intricate networks based on factors such as family and ethnicity. Social networks serve as a platform via which various social resources, such as information, power, and prestige, are intricately interwoven. These complex and interconnected systems provide individuals with social capital (Bourdieu, 1986). Brockman et al. (2019) suggest that interactions formed via social networks have an impact on the allocation of resources within China's capital market. According to Fernández-Pérez et al. (2016), corporate leaders engage in the formation of a social network in order to acquire limited resources, including material riches, power, and confidential information, via developing connections with external entities. This phenomenon has greater prominence among organizations that engage in anomalous earnings management, related-party transactions, and intercompany loans. Social capital, which is derived through social networks, has a significant impact on the economic behavior of corporations. This influence is exerted via several mechanisms, such as shaping the flow and quality of information inside enterprises, providing sources of both rewards and punishments, and fostering trust among stakeholders.

2.2. CEO social capital and cost of debt

We incorporate both social capital theory and network theory as the theoretical underpinning to our investigation of the impact of CEO social capital on the cost of debt. According to social capital theory, social networks and the relationships within them have inherent value, suggesting that individuals and organizations can benefit from their connections, which can include access to information, resources, trust, and social support. This theory emphasizes the importance of social ties, norms, and trust in facilitating cooperation and achieving shared goals (Putnam, 2000). Further, network theory explores how social networks can impact various outcomes, including information flow and resource access (Stanley and Katherine, 1994). For example, how social capital centrality within a network affects the cost of debt.

The Chinese banking industry is much bigger than its stock market due to the lagging development of the capital market and stringent issuance restrictions. In China, bank loans have greater significance in facilitating the development and expansion of Chinese enterprises than do equity and bond financing (Wu et al., 2020). According to Allen et al. (2005), the Chinese banking sector has a significant size advantage over its financial market, and debt financing remains the primary avenue for firms. Ayyagari et al. (2010) suggest that Chinese firms with bank financing grow faster than firms without bank financing. Currently, the consideration of debt financing capacity and the cost of debt have significant relevance in management decision-making in China. However, enterprises cannot always obtain bank loans at a low cost due to the limited financial resources of banks and the financing constraints of firms. Allen et al. (2005) suggest that alternative financing channels, such as those based on social networks, support the growth of Chinese firms.

The findings of prior studies indicate that CEOs are more likely to obtain limited resources if they have greater social capital and an important position in the social network. For example, Engelberg et al. (2012) and Karolyi (2018) find that senior executives' social capital increases the probability of a company obtaining low-interest loans and reducing loan contract restrictions. Freedman and Jin (2017) demonstrate that borrowers with social ties are more likely to be funded and receive lower interest rates. Liu et al. (2023) explore the relation between prosocial CEOs and the cost of debt and find a negative relationship between the presence of prosocial CEOs and firms' cost of debt. Godlewski et al. (2012) find that the debt cost of borrowers is lower when the lender is more central in the syndicated lending market.

CEO social capital derived from their social networks enables them to effectively obtain and disseminate resources and knowledge (Horton et al., 2012; Cao et al., 2015). As the one responsible for leading the senior executive team within an organization, the CEO plays a significant role in facilitating access to information pertaining to the availability and amount of bank funds (Westphal et al., 2006). On one side, the acquisition of knowledge by a CEO with high social capital may contribute to the reduction in information asymmetry between banks and firms, as well as facilitate the establishment of connections between banks and enterprises (Fischer and Pollock, 2004; Du et al., 2015; Ferris et al., 2019). In contrast, CEO social capital entails a supervisory and incentivizing function,

whereby the owner's social capital is subject to monitoring, punishment, and reward within the context of their social network (Kolev et al., 2019; Zhao and Chan, 2023). The social network platform can use "community penalties" as a means of addressing rule violations committed by its members, or alternatively, choose not to engage with individuals who fail to adhere to the established guidelines of the social network (Pret and Carter, 2017). This implies that the reputation of an individual CEO has a significant part in the potential consequences of punishment and reward, leading to a decline or deterioration in their worth within the future employment market. We posit that social capital lowers cost of debt due to information transparency improvement. CEOs are constantly being monitored within their network which leads to enhanced information quality and transparency. As a result, a greater extant of social capital can help reduce the costs that borrowers face in screening the lenders' creditworthiness before the debt is issued and in monitoring their compliance with debt covenants after the debt is issued, thereby contributing to a reduction in the cost of debt. Consequently, we propose our first hypothesis:

Hypothesis 1. CEO social capital is negatively associated with cost of debt.

2.3. CEO social capital, mechanism environment and cost of debt

The socioeconomic institutional and cultural environment affects the operations of organizations and enterprises. Fukuyama (1996) argues that the culture and religion of successful countries has a crucial role in the cooperation and trust of members in large organizations. Knack and Keefer (1997) suggest that there are faster and better economic growth rates for countries with more social capital than those with less social capital. Large business organizations are created and efficiently managed only when social trust has been established (La Porta et al., 1997). Social capital enhances efficiency within society, providing a way to produce trust among people (Dasgupta, 2005). Individuals' social trust can only be established through repeated interactions in their social network. It relies on the long-term relationship between two parties. Higher CEO social capital accompanies higher social trust. Therefore, social trust based on CEO social capital can help a company remove barriers to resource allocation and extend its bargaining power.

Significant variations persist in the marketization processes across diverse areas. Despite the notable accomplishments facilitated by the economic reform in China, significant variations in marketization processes persist across various areas (Fan et al., 2011). Ye et al. (2010) provide evidence to support the claim that areas with low levels of marketization have a lower degree of application of rules and regulations pertaining to market operations compared to regions with high levels of marketization. Banks face elevated risks when evaluating loan applications from enterprises operating in locations characterized by low levels of marketization. The ties that exist outside of legal frameworks, which are based on social capital, can be seen as a method for privately enforcing contracts (Platteau, 1994a, 1994b). Hence, the presence of social trust among CEOs, which is contingent upon their social capital, has the potential to mitigate risks for banks. Consequently, this may lead to a reduction in the cost of loans, particularly when trust between a CEO and a lender is a contributing factor.

Previous studies conclude that social trust is the cornerstone of a market economy. Social trust diminishes the role of debt to mitigate agency problems and can be a substitute for formal institutions (Chauhan et al., 2022). Ang et al. (2015) find that foreign high-tech companies take local trustworthiness into account when making investment decisions in China. Firms prefer to invest in regions where local partners and employees are considered more trustworthy, which can mitigate the risk of expropriation of their intellectual property. Using the data from China's inter-provincial trust survey, Zhang and Ke (2003) find the leverage of social trust in a region is closely related to the possibility of people's transactions being repeated, and the scale and frequency of transactions in regions with low social trust are significantly lower than those in regions with high levels of trust. Moreover, Chen et al. (2016) reveals a positive impact of social trust on access to bank loans for privately controlled firms. These findings suggest that firms located in the regions with low social trust have difficulty in accessing bank loans at competitive rates.

However, CEO social capital can increase trust between the creditor and the debtor and reduce the risk of overflow prices. Firms with high CEO social capital in the regions with low social trust are more trustworthy, and their corporation earnings announcements and accounting numbers are more credible (Jha, 2019). Moreover, with respect to the association between social capital and managerial reputation (Kirkbesoglu, 2013), these firms repay their loan interest and principal in a timely manner and demonstrate better moral standards since their CEOs value their reputations and do not wish to default (Diamond, 1989). Fogel et al. (2018) suggest that firms with CFOs having higher social capital can borrow with fewer covenant restrictions. The following hypotheses are underpinned by the resource-based view, suggesting that firms can gain a competitive advantage by leveraging their unique resources and capabilities, and therefore social capital can be seen as a valuable resource that firms can use to access external information and support (Barney, 1991).

The mitigation of information asymmetry resulting from agency conflicts of interest is substantially influenced by the market environment and institutional factors (Renders and Gaeremynck, 2012). This influence is particularly pronounced in China, where there exists significant regional disparity in market environments (Li et al., 2018; Guo et al., 2021). In regions characterized by strong marketization, regulators are more inclined to expose corporate false statements, and companies demonstrate a heightened eagerness to access non-relational resources. Likewise, when social trust is strong, the community tends to create strong scrutiny demanding high information transparency from firms. In our study, we posit that CEO's social capital is a form of informal tie between the lenders and the borrowers; hence, the effect of social capital on cost of debt is stronger even when there is a lack of information verification induced by the regulators through marketisation or the society norm.

Hypothesis 2a. The impact of CEO social capital is more pronounced in regions with a low degree of marketization than it is in regions with a high degree of marketization.

Hypothesis 2b. The impact of social capital is more pronounced in regions with low levels of social trust than in regions with high levels of social trust.

2.4. CEO social capital, cost of debt and mediation effect of information asymmetry

Information asymmetry is one of the important factors contributing to the financial constraints of enterprises (Kaplan and Zingales, 1997). Information asymmetry is associated with the quality of information disclosure. Given that firms have more private information about their accounting and performance than outsiders, lenders who only have access to public information have an information disadvantage when they provide capital to a firm, because the firm can benefit through its private information channels. This information asymmetry results in conflicts of interest between the financer and funder, and the degree of information asymmetry affects the cost of corporate capital (Myers and Majluf, 1984). In practice, Barron and Qu (2014) examined the effect of public information quality on market prices and found that high-quality public disclosure decreases the cost of capital when information asymmetry is high. Nagar et al. (2019) find that information disclosure quality alleviates the information asymmetry between traders. Cormier et al. (2013) and Chowdhury et al. (2018) suggest earnings management by a firm has a positive relationship with information asymmetry, and higher discretionary accruals are accompanied by greater information asymmetry.

Personal connections provide an effective channel for information exchange, allowing the transmission of knowledge, ideas, or private information. Bian and Qiu (2000) point out that social capital reflects the ability of enterprises to obtain scarce resources through social contact. CEO social capital generated from social networks reduces information asymmetry between traders via information sharing (Engelberg et al., 2012; Larcker et al., 2013; El-Khatib et al., 2015), and lenders use social network as channels to obtain valuable information of enterprises in a timely manner and make appropriate decisions to avoid risk (Zhang, 2008). Engelberg et al. (2012) show that informal ties between borrowers and lenders are associated with larger loan amounts, lower interest rates and less restrictive covenants. Consequently, the following hypothesis is proposed:

Hypothesis 3. Information asymmetry mediates the impact of CEO social capital on cost of debt.

3. Research design

3.1. Sample and data

Data for this study was collected from various sources. The data for CEOs' social networks were sourced from the senior executives' characteristics sub-database within the China Securities Markets and Accounting Research (CSMAR) database after it became publicly available in 2008. CSMAR provides social network data for senior executives on their current and past employment, educational background, affiliations with professional associations and not-for-profit associations, and the relationships of their friends and family, alumni and business networks for public companies. We relied on the unique identification code assigned to each CEO in the CSMAR database and gathered the information on CEOs' business relationships with other firms' senior executives and directors (Kuhnen, 2009). As the data of senior executives' social network characteristics in CSMAR terminated after 2017, our data was collected for the period between 2008 and 2017.

The data for cost of debt were sourced from Wind database. The social trust data were collected from Zhang and Ke (2003) and the marketization data were sourced from Liu et al. (2016). The information disclosure quality data were provided by the Shenzhen Stock Exchange. The remaining firm finance and governance data were obtained from the CSMAR database.

Our sample includes all firms listed on the Shanghai and Shenzhen Stock Exchanges. After removing financial institutions, the observations with missing CEO social capital data, ST firms and *ST firms[1] our final dataset consists of 6313 firm-year observations for the period 2008–2017.

3.2. Model specification

First, we examine the impact of CEO social capital on cost of debt using Eq. (1) in the full dataset (Hypothesis 1), sub-datasets of low and high marketization (Hypothesis 2a), and sub-datasets of low and high social trust (Hypothesis 2b):

$$COD_{i,t} = a_1 + a_2 SC_{i,t} + \sum Controls_{i,t} + Year\ FE + Industry\ FE + \varepsilon_{i,t} \quad (1)$$

In Hypothesis 3, we test the mediation effect of information asymmetry on the impact of CEO social capital on cost of debt, where the information asymmetry is a vector of discretionary accruals (DA) and information disclosure quality (IDQ). We expect that DA and IDQ mediate the effect CEO social capital on cost of debt.

Following Baron and Kenny (1986) and Wu et al. (2020), we employ a three-step procedure developed by Sobel (1982) to test the mediation effects of the two proxies for information asymmetry as follows:

[1] The missing CEO social capital data means that some of CEOs personal network data are not available in CSMAR. The delisting procedure of Chinese listed firms begin with special treatment, including ST/*ST, which means that the firm's performance does not meet the required standards by CSRC.

$$COD_{i,t} = \beta_0 + \beta_1 SC_{i,t} + \sum Controls_{i,t} + Year\ FE + Industry\ FE + \varepsilon_{i,t} \quad (2\text{-}1)$$

$$InformationAsymmetry_{i,t} = a_0 + a_1 SC_{i,t} + \sum Controls_{i,t} + Year\ FE + Industry\ FE + \varepsilon_{i,t} \quad (2\text{-}2)$$

$$COD_{i,t} = \beta_0' + \beta_1' SC_{i,t} + \beta_2 InformationAsymmetry_{i,t} + \sum Controls_{i,t} + Year\ FE + Industry\ FE + \varepsilon_{i,t} \quad (2\text{-}3)$$

The procedure for the mediation effect is presented in Fig. 1. Eq. (2-1) examines the total effect of CEO social capital on cost of debt, which is denoted by β_1. The effect of CEO social capital on information asymmetry is captured as a_1 in Eq. (2-2). In Eq. (2-3), β_1' denotes the direct effect of CEO social capital on cost of debt mediated by information asymmetry, and β_2 denotes the indirect effect of CEO social capital on cost of debt through the mediator of information asymmetry. Based on the definition of a mediator given by Baron and Kenny (1986), information asymmetry can be considered a mediator when the following four conditions are met: (1) CEO social capital is correlated with cost of debt and estimates that there is an effect that may be mediated ($\beta_1 \neq 0$); (2) CEO social capital is correlated with information asymmetry, which shows the mediator as though it were an outcome variable ($a_1 \neq 0$); (3) information asymmetry is shown to affect the cost of debt while controlling CEO social capital ($\beta_2 \neq 0$) – CEO social capital must be controlled because information asymmetry and cost of debt are both directly caused by CEO social capital; (4) to formulate a complete meditation effect, the effect of CEO social capital on cost of debt controlling for information asymmetry (β_1') should be zero ($\beta_1' = 0$). If all these conditions are met, the mediation effect is consistent with the hypothesis that information asymmetry completely mediates the relationship between CEO social capital and cost of debt. However, if the fourth condition is not satisfied, partial mediation is indicated.[2]

3.3. Measuring cost of debt

In the hypothesis development, we argue that firms with a greater extant of CEO social capital are likely to have a lower cost of borrowing. Hence, we follow Zou and Adams (2008) and Lim et al. (2018) and measure the cost of debt (COD) as interest expenses reported in the income statement plus capitalized interest scaled by the average of total liabilities in *t*–1 and *t*. The definitions of the variables are presented in Appendix A.

3.4. Measuring CEO social capital

Bourdieu (1986) defines social capital as the valuable resources that are linked to possession of a durable or temporary network of relationships of mutual acquaintance and recognition. Later, many scholars continued the important role of social network for social capital through they refined or expanded this concept. For example, Coleman (1988) and Woolcock (1998) define social capital as the information, trust and norms of reciprocity that exist in the relationships between individuals and in their social network, which is the real-world links between groups or individuals. Social networks are efficient channels for better communication and information sharing and contribute to the enforcement of prescribed norms (Hoi et al., 2019).

Similarly, CEO social capital is closely tied to his/her personal social network. CEO social networks includes alumni relationships, relationships with colleagues, business relationships, and other relationships. Shue (2013) defines alumni relationships in terms of whether the individuals share the same school. In terms of CEOs' work experience, Fracassi (2017) divides relationships with colleagues into relationships with current and former colleagues. Business relationships refer to the fact that both parties have strong business contacts (Kuhnen, 2009). Others relationship generally refer to whether CEOs are members of the same club, social or charity institution (Cai et al., 2016).

There are two means of measuring of CEO social capital. One is to directly measure the number of people in the CEO's social network, and the other is to estimate CEO social capital using graph theory method. In this study, we follow a long history of graph theory studies (Proctor and Loomis, 1951; Sabidussi, 1966; Bonacich, 1972; Freeman, 1977) to argue that network centrality—a set of characteristics that assesses a CEO's position within a whole network—is a relevant proxy for social capital. Following El-Khatib et al. (2015) and Fogel et al. (2018), we use Python to compute three measures of centrality: betweenness centrality (SC_B), closeness centrality (SC_C) and degree centrality (SC_D) as the proxies of CEO social capital.

Betweenness centrality (SC_B) is the number of shortest paths connecting any other two nodes through a certain node, which means how often the CEO is on the shortest path between two executives. If a node can connect more nodes, have a shorter path to all other nodes, and is located on the shortest path connecting any two other nodes, the node will in a more central position in the social network (El-Khatib et al., 2015):

$$SC\_B_k = \sum\nolimits_{i<j\neq k\in N} \frac{g_{ij(k)} \Big/ g_{ij}}{(n-1)(n-2)/2}$$

where g_{ij} is assigned 1 for any geodesic connecting *i* and *j*, and $g_{ij(k)}$ is assigned a value of 1 if the geodesic between *i* and *j* also passes through *k*.

[2] It is also noted by Baron and Kenny (1986) that these conditions are based on the coefficient estimates, as well as on the statistical significance.

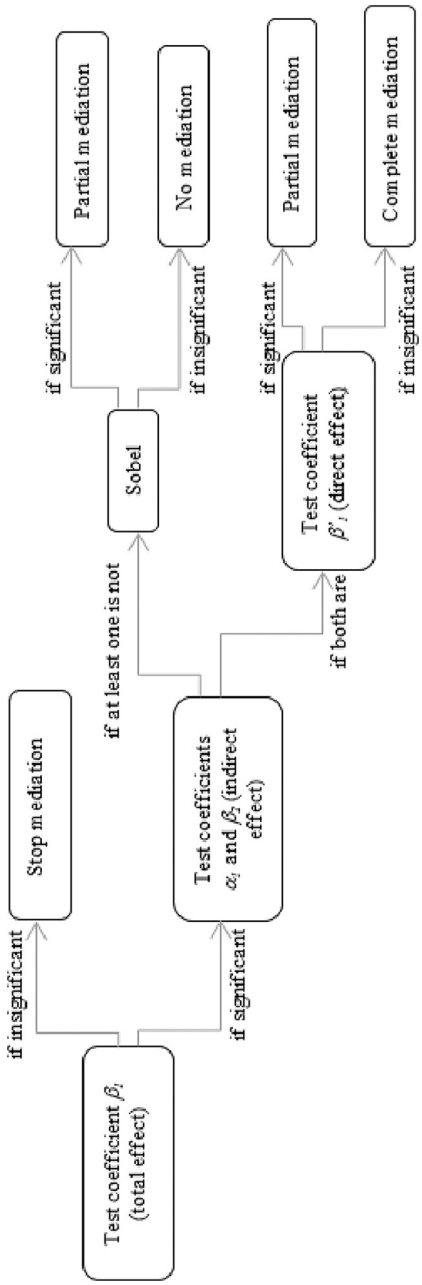

Fig. 1. Mediation effect test flow (Source: Wu et al. (2020)).

Closeness centrality (SC_C) measures the average of shortest distances between a node and all other nodes, reflecting the efficiency of information sharing between the CEO and other executives (El-Khatib et al., 2015):

$$SC\_C_i = \frac{n-1}{\sum_{i \neq j \in N} d_{ij}} \times \frac{n}{N}$$

where d_{ij} represents the shortest distance between nodes i and j, n is the size of the component i belongs to, and N is the size of the yearly network.

Degree centrality (SC_D) is the number of nodes directly connected to a certain node, reflecting the size of the CEO's personal network (El-Khatib et al., 2015):

$$SC\_D_i = \sum\nolimits_{j \neq i} x_{ij}$$

where x_{ij} is assigned 1 for the presence of a social connection between i and j.

As shown in Fig. 2, Node B has a degree centrality of 5 because it is directly connected to five nodes: A, C, D, E and F, and has more nodes than other nodes in this network. Since the average distance between Node B and other nodes is shortest, Node B has the highest closeness centrality while Node G has the lowest closeness centrality. Nodes F and E are not directly connected but they can connect in two pathways: F → B → E or F → A → B → E. The first pathway is the shortest and it must flow through Node B. In comparison to Node A, Node B has a higher betweenness centrality. All information flowing to or from the left side of the network must flow through Node B, thus Node B has the highest betweenness centrality. In conclusion, Node B is more central in this example of social network.

In order to facilitate the comparison of network centrality variables, consistent with El-Khatib et al. (2015) and Tang et al. (2017), the CEO social proxies are not computed based on the raw value of network centrality; instead, the percentile values are used, of which 0 represents the least centrality and 1 represents the most. To reflect CEO social capital comprehensively, we use the average of the percentile values of the sum of betweenness centrality (SC_B), closeness centrality (SC_C) and degree centrality (SC_D) as the overall proxy of CEO social capital (SC).

3.5. Marketization and social trust

Marketization index is sourced from Liu et al. (2016). The region of low marketization indicates the bottom 33% of the index, and the region of high marketization indicates the top 36% of the index. Social trust index is sourced from Zhang and Ke (2003), the low social trust represents the region is in the bottom 33% of the index, and the high social trust represents the region is in the top 33% of the index.

3.6. Mediators: Discretionary accruals and information disclosure quality

Information asymmetry is measured by two mediators: DA and IDQ. Following prior studies on DA, such as Dechow et al. (1995), Guay et al. (1996) and Bartov et al. (2000), we employ the modified Jones (1991) model to estimate the absolute value of earnings management accrued as follows:

$$TA_t = (\Delta CA_t - \Delta CL_t - \Delta CASH_t - \Delta STDEBT_t - DEPTN_t)/ASSET_{t-1}$$

where ΔCA_t presents the change of current assets at t, ΔCL_t presents the change of current liabilities at t, $\Delta CASH_t$ denotes the change of cash and cash equivalents during period t, $\Delta STDEBT_t$ denotes the change of debt, including current liabilities at t, $DEPTN_t$ denotes the expense of depreciation and amortization during period t, $ASSET_{t-1}$ notes the total assets at *t–1*.

$$NDA_t = \alpha_1\left(\frac{1}{A_{t-1}}\right) + \alpha_2(\Delta REV_t - \Delta REC_t) + \alpha_3(PPE_t)$$

$$TA_t = \alpha_1\left(\frac{1}{A_{t-1}}\right) + \alpha_2(\Delta REV_t - \Delta REC_t) + \alpha_3(PPE_t) + \upsilon_t.$$

where NDA_t denotes the non-discretionary accruals. TA_t denotes the total accruals during the period, A_{t-1} presents total assets at *t-1*. ΔREV_t denotes the change of revenue, which is calculated by the revenue in year t less the revenue in year *t–1* scaled by total asset at *t–1*. ΔREC_t presents the change in net receivables, which is estimated by the receivables in year t less the receivables in year *t–1* scaled by total assets at *t–1*. υ_t represents the DA at period t.

Another variable we use as the mediator of information asymmetry is IDQ. The Shenzhen Stock Exchange releases firms' information quality ratings as A, B, C or D level, in which A presents the highest information quality and D presents the lowest information quality. Information quality is an ordinal variable that equals 1, 2, 3, or 4 if the firm's information disclosure rating is D, C, B, or A, respectively, on the Shenzhen Stock Exchange.

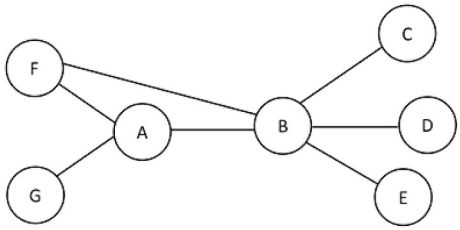

Fig. 2. Example of CEO social network.

3.7. Control variables

The control variables consist of firms' leverage (LEV), firm size (SIZE), firm performance (ROA), Tobin's Q (Q), fixed asset ratio (FIX), corporate governance (CGI), analyst following (AnaFollow), financial distress (*Z*-score), year (YEAR), and industry (INDUSTRY).[3]

Firm leverage is measured as the ratio of total liability to total assets. Higher business and financial risk incurred by higher leverage may cause an increase in the cost of debt (Zaman et al., 2011). Reeb et al. (2001) and Anderson et al. (2004) find that both leverage and size are significant determinants of cost of debt. Firm size is measured as the natural logarithm of the book value of total assets (Desender et al., 2016), which not only presents the magnitude of a firm's business, but also reflects the complexity of firm's operation. Firm size is expected to be negatively related to cost of debt. Rajan and Zingales (1995) explain that large firms prefer equity financing rather than debt financing, given that the additional cost of equity financing caused by information asymmetry is small for large firms. Besides, reputation advantage may also lead large firms to choose cheaper equity financing. Therefore, small firms are more often heavily indebted and rely on bank loans than larger firms (Berger and Udell, 1994). This negative relationship between firm size and leverage is supported by other studies (Faulkender and Petersen, 2006; Van Binsbergen et al., 2010).

Similarly, more profitable firms are less likely to have a high cost of borrowing, because highly profitable firms have lower default risk and benefit from lower cost of debt (Dhaliwal et al., 2008; Lorca et al., 2011). We use return on assets (ROA) as a proxy of profitability. ROA is measured by the ratio of income before extraordinary items to total assets (Gul and Tsui, 1997). Gordon and Myers (1998) explain that Tobins'Q value (Q) is the ratio of its business market valuation to the replacement costs of its assets. Ben-Horim and Callen (1989) suggest that Tobin's Q value is negatively related to the cost of capital because firms with a high market valuation and market expectations may have less debt and lower borrowing costs. FIX is defined as net fixed assets divided by total assets (Lin and Peasnell, 2000). Shailer and Wang (2015) argue that firms with high asset tangibility are easy to obtain bank loans because they may use tangible assets as collateral. Therefore, these firms may have a higher default risk and higher cost of debt. FIX is expected to be positively related to cost of debt.

Previous research has found that efficient corporate governance mechanisms can moderate managerial opportunism, increasing the protection of debtholders and the confidence of investors (Anderson et al., 2004; Klock et al., 2005). Bhojraj and Sengupta (2003) and Ashbaugh-Skaife et al. (2006) find that superior corporate governance can mitigate default risk and increase credit rating. Hence, good corporate governance is expected to have a negative impact on cost of debt (Bradley and Chen, 2011; Aldamen and Duncan, 2012). Prior studies (e.g., Lang et al., 2004; Yu, 2008; Yu, 2010) suggest that financial analysts have the potential to provide an additional oversight role as another mechanism of external governance. Analyst following can reduce firm opacity and increase firm transparency, and so may reduce the cost of debt financing (Mansi et al., 2011; Derrien et al., 2016; Ferrer et al., 2019). The risk of bankruptcy may also influence a firm's cost of debt (Van Binsbergen et al., 2010). Altman (1968) developed a Z-score that reflects the risk of financial distress. A higher Z-score indicates a better financial condition, which is expected to reduce the cost of debt.

4. Results and discussion

4.1. Descriptive statistics

Table 1 presents the descriptive statistics of the key variables in our empirical analysis. The dependent variable (cost of debt, COD) has a mean (median) of 0.023 (0.022), with a range between 0.000 and 0.065. The independent variables contain four CEO social capital variables: betweenness centrality, closeness centrality, degree centrality and the average value of the three measures of centrality. The mean (median) for the average centrality (SC) is 0.494 (0.498), with a range between 0.000 and 0.980. The degree centrality for CEO social network (SC_D) has mean (median) of 0.488 (0.501), with a range between 0.000 and 0.990. The betweenness centrality (SC_B) and the closeness centrality (SC_C) show similar trends to degree centrality, their mean (median) values are 0.496 (0.502) and 0.497 (0.501), respectively.

The mean (median) of DA is 0.066 (0.046), with a range between 0.001 and 0.367, indicating that most firms had low discretionary

[3] All equations are controlled firm fixed effect (FE). The results (not tabulated in this paper) are consistent with the results using Year FE and Industry FE.

Table 1
Descriptive statistics.

	Mean	SD	Min	P25	P50	P75	Max	Skew	Kurt	N
Dependent variables:										
COD	0.023	0.016	0.000	0.010	0.022	0.035	0.065	0.441	2.445	6313
COD_1	0.025	0.016	0.001	0.012	0.024	0.036	0.065	0.361	2.344	6313
COD_2	0.066	0.028	0.025	0.048	0.061	0.078	0.187	1.339	5.478	5315
Social capital variables:										
SC	0.494	0.290	0.000	0.248	0.498	0.746	0.980	−0.085	1.796	6313
SC_B	0.496	0.293	0.000	0.251	0.502	0.751	0.989	−0.119	1.861	6313
SC_C	0.497	0.292	0.000	0.240	0.501	0.748	0.990	−0.015	1.792	6313
SC_D	0.488	0.306	0.000	0.235	0.501	0.753	0.990	−0.005	1.792	6313
Mediators:										
DA	0.066	0.067	0.001	0.021	0.046	0.087	0.367	2.061	8.082	6272
IDQ	3.072	0.604	1	3	3	3	4	−0.338	3.876	4012
Control variables:										
LEV	0.456	0.200	0.061	0.299	0.449	0.608	0.890	0.107	2.198	6313
SIZE	22.198	1.302	19.873	21.260	21.995	22.903	26.262	0.847	3.591	6313
ROA	0.046	0.051	−0.118	0.016	0.040	0.071	0.210	0.183	4.997	6313
Q	2.142	1.818	0.213	0.883	1.630	2.792	10.037	1.922	7.484	6313
FIX	0.239	0.169	0.003	0.102	0.208	0.340	0.715	0.760	2.937	6313
CGI	4.941	3.119	0	30	4	7	14	0.775	2.796	6313
AnaFollow	5.725	9.053	0	0	1	8	65	2.037	7.331	6313
Z-Score	5.262	4.655	0.818	2.509	3.841	6.209	30.00	2.806	12.88	6313

Notes: This table presents the descriptive statistics for the variables used in this study. The sample consists of 6313 firm-year observations over a period of 10 years from 2008 to 2017. The definitions of all variables are provided in Appendix A.

Table 2
Pearson correlation matrix.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) COD	1									
(2) SC	0.039***	1								
(3) LEV	0.305***	0.178***	1							
(4) SIZE	0.073***	0.209***	0.487***	1						
(5) ROA	−0.305***	0.012	−0.428***	−0.054***	1					
(6) Q	−0.268***	−0.206***	−0.494***	−0.480***	0.336***	1				
(7) FIX	0.374***	0.088***	0.087***	0.079***	−0.184***	−0.164***	1			
(8) CGI	0.087***	0.186***	0.204***	0.261***	−0.027	−0.221***	0.159***	1		
(9) AnaFollow	−0.067***	0.159***	−0.004	0.225***	0.314***	−0.047***	0.037***	0.178***	1	
(10) Z-Score	−0.320***	0.162***	−0.682***	−0.383***	0.720***	0.389***	−0.183***	0.180***	0.017	1

Notes: This table presents the Pearson correlation between all continuous variables used in this study. The sample consists of 6313 firm-year observations over a period of 10 years from 2008 to 2017. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

accruals. IDQ showed mean and median values of 3.072 and 3.000 respectively, indicating most firms have an information disclosure quality rating above B on the Shenzhen Stock Exchange.

To address multicollinearity concerns, we winsorized all continuous variables at the 1st and 99th percentiles to avoid the likely effects of extreme outliers. The Pearson correlation coefficients are shown in Table 2. All correlation values of independent variables are well below the critical value of 0.8. Following Gujarati (2003), we also conduct a variance inflation factor (VIF) test. The results (not tabulated in this paper) indicate that the largest VIF value is 3.04, which is well below the critical value of 10. Therefore, we conclude that multicollinearity does not affect our results.

4.2. Regression analyses for hypotheses

The regression estimations for Eq. (1) for the measures for CEO social capital centrality are reported in Columns 1–5 of Table 3 for the full sample, firms with low and high marketization indices, and firms with low and high social trust indices, respectively. The adjusted R^2 values for Eq. (1) for all models are 0.290, 0.307, 0.374, 0.312 and 0.317, respectively. The F-statistics are statistically

Table 3
Baseline regression results.

	(1)	(2)	(3)	(4)	(5)
	Full Sample	Low Market	High Market	Low Trust	High Trust
Variable	COD	COD	COD	COD	COD
SC	−0.002***	−0.005***	−0.000	−0.006***	−0.003**
	(−3.73)	(−4.04)	(−0.18)	(−5.06)	(−2.01)
Coef. Diff: (2)–(3)/(4)–(5)		$\chi^2 = 5.59$**		$\chi^2 = 3.42$*	
SIZE	−0.000*	0.000	−0.001**	0.000	−0.000
	(−1.69)	(0.01)	(−2.20)	(0.34)	(−0.45)
LEV	0.017***	0.013***	0.024***	0.015***	0.024***
	(11.71)	(5.33)	(7.09)	(6.27)	(8.81)
Q	−0.000*	−0.000	−0.001**	−0.001*	0.000
	(−1.69)	(−0.90)	(−1.99)	(−1.73)	(0.69)
ROA	−0.031***	−0.031***	−0.042***	−0.027***	−0.021**
	(−7.47)	(−4.45)	(−4.18)	(−3.98)	(−2.49)
FIX	0.025***	0.025***	0.027***	0.027***	0.026***
	(20.48)	(12.28)	(9.31)	(13.63)	(10.18)
CGI	−0.000*	0.000	−0.000	−0.000	−0.000***
	(−1.72)	(0.55)	(−0.71)	(−0.28)	(−3.83)
AnaFollow	−0.000***	−0.000***	−0.000**	−0.000***	−0.000***
	(−6.43)	(−3.38)	(−2.22)	(−3.37)	(−3.85)
Z-Score	−0.000***	−0.000**	−0.000	−0.000	−0.000
	(−3.15)	(−2.57)	(−0.37)	(−1.62)	(−1.48)
Intercept	0.038***	0.025***	0.056***	0.028***	0.020**
	(8.43)	(3.44)	(5.10)	(3.62)	(2.23)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adj.R^2	0.290	0.307	0.374	0.312	0.317
F-stat	76.64***	28.98***	22.26***	30.65***	23.03***
N	6313	2152	1138	2223	1618

Notes: This table presents the estimated results of the baseline regression models. COD = cost of debt, (interest charges + interest capitalized) scaled by the average of total liabilities in *t*–1 and *t*. The results shown, in Column 1, present the estimated coefficients for full sample. The results, shown in Columns 2 and 3, present the estimated coefficients for the regions with low and high marketization indices respectively. The results, shown in Columns 4 and 5, present the estimated coefficients for the regions with low and high social trust indices respectively. The first row (number) represents the estimated coefficient, the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

significant for all models.

As shown in Column 1, the coefficient of CEO social capital is negatively associated with the cost of debt ($\alpha_2 = -0.002$, $p < 0.01$), suggesting that CEO social capital decrease the cost of debt. This result indicates that for firms with the same level of litigation risk, an increase in CEO social capital from the 25th to 75th percentile resulting a decrease in the cost of debt by 4.3%.[4] This result is consistent with the expectation underpinned by our developed theoretical framework and prior studies including Putnam (2001), Engelberg et al. (2012), Fernández-Pérez et al. (2016) and Karolyi (2018), and thus we conclude that Hypothesis 1 is supported.

Hypothesis 2a and Hypothesis 2b predict that the impact in regions with a low degree of marketization (low degree of social trust) is more pronounced than it in regions with a high degree of marketization (high degree of social trust); that is, $\alpha_{2\_L} < \alpha_{2\_H}$. To analyze these impacts, we divided the full sample into three regions according to the percentile values of the marketization and social trust indices and chose low and high regions (bottom 33% and top 33%) as the sub samples. The results for H2a, shown in Columns 2 and 3 of Table 3, reveal that CEO social capital has a negative association ($\alpha_{2\_L} = -0.005$, $p < 0.01$) with cost of debt in the range with low marketization index. However, this impact ($\alpha_{2\_H} = -0.000$, $p > 0.1$) is not found in the range with high marketization index. This finding suggests that the effect of CEO social capital in regions with a low degree of marketization is more pronounced than it in regions with a high marketization index ($\chi^2 = 5.59$, $p < 0.05$). This finding confirms Hypothesis 2a.

The results for Hypothesis 2b indicate that the coefficients for CEO social capital ($\alpha_{2\_L} = -0.006$, $p < 0.01$ in Column 4; $\alpha_{2\_H} = -0.003$, $p < 0.05$ in Column 5) are negatively related to cost of debt irrespective of the level of social trust. Due to $\alpha_{2\_L} < \alpha_{2\_H}$, we could further conclude that the impact in areas with a low level of social trust is more pronounced than it in regions with a high level of social trust ($\chi^2 = 3.42$, $p < 0.10$), which supports Hypothesis 2b. Our findings are consistent with Ye et al. (2010) and Zhang and Li (2012), who conclude that the social capital of senior executives becomes more significant in alleviating information asymmetry and enhancing the trust between lenders and borrowers in regions with low levels of marketization and social trust.

[4] Note that −0.002 × (0.746–0.248) / 0.023 = 4.3%, where −0.002 is the estimated coefficient of CEO social capital in Table 3; 0.746 is the 75th percentile value of CEO social capital; 0.248 is the 25th percentile value of CEO social capital; and 0.023 is the mean of the cost of debt for our sample firms.

Table 4
Mediation effect tests.

	Panel A: Discretionary accruals			Panel B: Information disclosure quality		
	(1)	(2)	(3)	(4)	(5)	(6)
Variable	COD	DA	COD	COD	IDQ	COD
SC	−0.002***	−0.004	−0.002***	−0.002*	0.252***	−0.001
	(−3.75)	(−1.24)	(−3.70)	(−1.94)	(3.52)	(−1.16)
	[β_1]	[α_1]	[$\beta_1^{'}$]	[β_1]	[α_1]	[$\beta_1^{'}$]
DA			0.008***			
			(2.87)			
			[β_2]			
IDQ						−0.003***
						(−6.58)
						[β_2]
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Sobel Test	β_1= −0.002***			β_1= −0.002*		
	α_1= −0.004			α_1= 0.252***		
	β_2= 0.008***			β_2= −0.003***		
	$\beta_1^{'}$= −0.002***			$\beta_1^{'}$= −0.001		
	Sobel test z–stat = |–1.137| > |0.97|			No Sobel test is required		
Mediation Effect	Partial mediation effect			Complete mediation effect		
N	6313			4012		

Notes: This table presents the mediation effects of information asymmetry (discretionary accruals is shown in Panel A and information disclosure quality is shown in Panel B) on the relationship between CEO social capital and cost of debt. In Panel B, we use the causal stepwise approach with ordered probit model because IDQ is an ordinal variable. To validate the results from our mediation analysis and to check the robustness of the results, we undertake bootstrapping for both mediation models of discretionary accruals and information disclosure quality. We find that our results remain robust using bootstrapping. Furthermore, we use SEM to robust the results for IDQ as a mediator. The results (not tabulated in this paper) remain robust via SEM. The first row (number) represents the estimated coefficient, the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

Table 4 presents the mediation effects of information asymmetry on the relationship between CEO social capital and the cost of debt. Column 1 of Panel A reports the total effect ($\beta_1 = -0.002, p < 0.01$) of CEO social capital on the cost of debt, Column 2 shows the effect of CEO social capital on DA, and Column 3 identifies the direct effect of CEO social capital on the cost of debt mediating DA. Following Fig. 1, we find that the coefficients β_1 and $\beta_1^{'}$ of CEO social capital are significantly negative in Columns 1 and 3 ($\beta_1 = -0.002, p < 0.01; \beta_1^{'} = -0.002. p < 0.01$), which suggests that the direct effect denoted by $\beta_1^{'}$ decreases by an identical amount as the total effect denoted by β_1. Moreover, a negative effect of CEO social capital on DA ($\alpha_1 = -0.004, p > 0.1$) in Column 2 means that firms with high CEO social capital are not related to engaging in earnings management, while the positive association ($\beta_2 = 0.008, p < 0.01$) between DA and cost of debt in Column 3 suggests that firms with high CEO social capital perform poorly at reducing the cost of debt when firms suffer information asymmetry. According to Fig. 1, the Sobel test is required because α_1 is insignificant. Given that the absolute value of the *z*-stat of Sobel test is 1.262, which is greater than the critical value of 0.97, that is, |–1.262| > |0.97|, we conclude that DA partially mediate the negative impact of CEO social capital on cost of debt.

In Panel B, Columns 4–6 of Table 4, we examine whether information disclosure quality, proxied as IDQ, serves as a mediator of the impact of CEO social capital on cost of debt.[5] First, we note the coefficient of CEO social capital is significantly negative ($\beta_1 = -0.002, p < 0.10$) in Column 4, confirming the total effect of CEO social capital on cost of debt. Then we test the indirect effect of CEO social capital on information disclosure quality and find that both α_1 and β_2 are significant ($\alpha_1 = 0.252, p < 0.01; \beta_2 = -0.003, p < 0.01$). We do not need to test the direct effect of CEO social capital on cost of mediating information disclosure quality because an insignificant coefficient of $\beta_1^{'}$ ($\beta_1^{'} = -0.001, p > 0.10$) is seen, which indicates a complete mediation effect by information disclosure quality. These findings suggest that an increase in CEO social capital in a firm forces the firm to improve its information disclosure quality, and that improved information disclosure quality reduces the cost of debt.[6]

[5] In Panel B in Table 4, we use the causal stepwise approach with ordered probit model because IDQ is an ordinal variable.

[6] To validate the results from our mediation analysis and to check the robustness of the results, we undertake bootstrapping for both mediation models of discretionary accruals and information disclosure quality. We find that our results remain robust using bootstrapping. Furthermore, we use the structural equation modeling (SEM) to robust the results for IDQ as a mediator. The results (not tabulated in this paper) remain robust via SEM.

Table 5
Alternative measures of social capital.

	(1)	(2)	(3)
Variable	COD	COD	COD
SC_B	−0.002***		
	(−3.81)		
SC_C		−0.002***	
		(−3.66)	
SC_D			−0.002***
			(−3.43)
SIZE	−0.000*	−0.000*	−0.000*
	(−1.71)	(−1.67)	(−1.76)
LEV	0.017***	0.017***	0.017***
	(11.72)	(11.69)	(11.71)
Q	−0.000*	−0.000*	−0.000*
	(−1.67)	(−1.66)	(−1.74)
ROA	−0.031***	−0.032***	−0.031***
	(−7.47)	(−7.50)	(−7.45)
FIX	0.025***	0.025***	0.025***
	(20.46)	(20.48)	(20.50)
CGI	−0.000*	−0.000*	−0.000*
	(−1.71)	(−1.74)	(−1.75)
AnaFollow	−0.000***	−0.000***	−0.000***
	(−6.43)	(−6.45)	(−6.41)
Z-Score	−0.000***	−0.000***	−0.000***
	(−3.16)	(−3.16)	(−3.13)
Intercept	0.037***	0.037***	0.038***
	(8.41)	(8.42)	(8.49)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Adj_R^2	0.290	0.289	0.289
F-stat	76.67***	76.62***	76.56***
N	6313	6313	6313

Notes: This table presents the regression results of alternative measures of social capital. SC_B is the betweenness centrality reflecting the degree to which a node controls the network connection path of other nodes. SC_C is the closeness centrality measuring how close a node is to other nodes. SC_D is the degree centrality representing the number of nodes connected to a certain node. The first row (number) represents the estimated coefficient, and the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

4.3. Additional analyses

We conduct a variety of sensitivity analyses to ensure the robustness of our primary results for Hypotheses 1, 2a and 2b. First, we use three different alternative measures of CEO social capital; that is, betweenness centrality (SC_B), closeness centrality (SC_C) and degree centrality (SC_D). The results, shown in Table 5, are consistent with the result presented in Column 1 of Table 3, indicating that Hypothesis 1 is robustly tested by the three different alternative measures of CEO social capital.

Second, the results, shown in Table 6, are consistent with the results presented in Columns 2–5 of Table 3. In particular, we find the patterns of $\alpha_{2\_L} < \alpha_{2\_H}$ in both panels for marketization and social trust, which further confirm our expectations for Hypothesis 2a and 2b.

Third, two alternative measures of the cost of debt replace COD to test the robustness of the baseline results. Following Jiang (2009) and Ni et al. (2019), we adopt COD_1, which is measured as the interest expenses reported in the income statement plus service charges and other financial expenses scaled by the average of total liabilities in *t*–1 and *t*. Moreover, although bank loans form a large proportion of debt in Chinese firms (Wu et al., 2020), it is not appropriate to assume that the interest expenses are solely interest on bank loans. This is because COD is calculated as the interest expenses reported in the income statement plus capitalized interest scaled by total liabilities, and interest expenses include interest paid to bank loans and bonds, while total liabilities contain non-interest-bearing liabilities that are not directly related to debt financing. We thus develop COD_2, which is calculated as the interest expenses reported in the income statement plus capitalized interest scaled by the interest-bearing liabilities. We re-regress all models of Eq. (1) accordingly. The results, reported in Panels A and B of Table 7, are consistent with the findings in Table 3.

Fourth, the extant literature suggests that executives' political affiliates are considered as influential factors in CEO social capital. For example, Servaes and Tamayo (2017) report that firms' political capital generated through executives being involved in government or through the networks shared by both politicians and executives can be recognized as a kind of CEO social capital. Schoenherr (2019) stresses that as important social capital, an executive's political network enables private firms to obtain greater government resource allocations. Faccio (2006) and Tang et al. (2016) find that executives' political connections can increase firm value. Boubakri et al. (2012) support this, finding that firms with politically connected executives are deemed to have lower risk than

Table 6
Alternative measures of social capital for marketization and social trust breakdowns.

	Panel A: Marketization						Panel B: Social Trust					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Low Market			High Market			Low Trust			High Trust		
Variable	COD			COD			COD			COD		
SC_B	−0.004***			0.000			−0.005***			−0.002**		
	(−4.15)			(0.07)			(−5.14)			(−2.00)		
SC_C		−0.004***			−0.000			−0.005***			−0.003**	
		(−3.82)			(−0.01)			(−4.43)			(−2.43)	
SC_D			−0.004***			−0.001			−0.006***			−0.002
			(−3.81)			(−0.60)			(−5.22)			(−1.44)
SIZE	−0.000	0.000	−0.000	−0.001**	−0.001**	−0.001**	0.000	0.000	0.000	−0.000	−0.000	−0.000
	(−0.01)	(0.02)	(−0.07)	(−2.22)	(−2.22)	(−2.17)	(0.29)	(0.31)	(0.30)	(−0.48)	(−0.36)	(−0.54)
LEV	0.013***	0.013***	0.013***	0.024***	0.024***	0.024***	0.015***	0.015***	0.015***	0.024***	0.024***	0.024***
	(5.33)	(5.29)	(5.34)	(7.08)	(7.08)	(7.13)	(6.28)	(6.19)	(6.30)	(8.81)	(8.82)	(8.78)
ROA	−0.000	−0.000	−0.000	−0.001**	−0.001**	−0.001**	−0.000*	−0.000*	−0.001*	0.000	0.000	0.000
	(−0.88)	(−0.87)	(−0.94)	(−1.99)	(−1.99)	(−2.00)	(−1.69)	(−1.67)	(−1.83)	(0.69)	(0.73)	(0.68)
Q	−0.032***	−0.032***	−0.031***	−0.042***	−0.042***	−0.041***	−0.027***	−0.028***	−0.027***	−0.021**	−0.021**	−0.021**
	(−4.48)	(−4.49)	(−4.41)	(−4.20)	(−4.19)	(−4.14)	(−3.98)	(−4.04)	(−3.95)	(−2.49)	(−2.53)	(−2.46)
FIX	0.024***	0.025***	0.025***	0.027***	0.027***	0.027***	0.026***	0.027***	0.027***	0.026***	0.026***	0.026***
	(12.22)	(12.28)	(12.32)	(9.30)	(9.30)	(9.33)	(13.55)	(13.62)	(13.72)	(10.17)	(10.20)	(10.15)
CGI	0.000	0.000	0.000	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000***	−0.000***	−0.000***
	(0.60)	(0.47)	(0.55)	(−0.71)	(−0.71)	(−0.70)	(−0.24)	(−0.41)	(−0.27)	(−3.82)	(−3.81)	(−3.86)
AnaFollow	−0.000***	−0.000***	−0.000***	−0.000**	−0.000**	−0.000**	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***
	(−3.37)	(−3.39)	(−3.38)	(−2.24)	(−2.23)	(−2.19)	(−3.35)	(−3.38)	(−3.35)	(−3.84)	(−3.84)	(−3.86)
Z-Score	−0.000**	−0.000**	−0.000**	−0.000	−0.000	−0.000	−0.000*	−0.000*	−0.000	−0.000	−0.000	−0.000
	(−2.57)	(−2.56)	(−2.57)	(−0.37)	(−0.37)	(−0.36)	(−1.65)	(−1.66)	(−1.55)	(−1.47)	(−1.49)	(−1.47)
Intercept	0.025***	0.025***	0.025***	0.056***	0.056***	0.056***	0.028***	0.028***	0.028***	0.020**	0.020**	0.021**
	(3.43)	(3.44)	(3.51)	(5.11)	(5.11)	(5.10)	(3.62)	(3.62)	(3.67)	(2.24)	(2.17)	(2.31)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.307	0.306	0.306	0.374	0.374	0.375	0.312	0.310	0.313	0.317	0.317	0.316
F-stat	29.02***	28.91***	28.91***	22.26***	22.26***	22.28***	30.69***	30.40***	30.73***	23.03***	23.11***	22.94***
N	2152	2152	2152	1138	1138	1138	2223	2223	2223	1618	1618	1618

Notes: This table presents the regression results of alternative measures of social capital. SC_B is the betweenness centrality reflecting the degree to which a node controls the network connection path of other nodes. SC_C is the closeness centrality measuring how close a node is to other nodes. SC_D is the degree centrality representing the number of nodes connected to a certain node. The results, shown in Panel A, present the estimated coefficients for the regions with low and high marketization indices. The results, shown in Panel B, present the estimated coefficients for the regions with low and high social trust indices. The first row (number) represents the estimated coefficient, and the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

Table 7
Alternative measures for cost of debt.

Panel A: COD_1

	(1)	(2)	(3)	(4)	(5)
	Full Sample	Low Market	High Market	Low Trust	High Trust
Variable	COD_1	COD_1	COD_1	COD_1	COD_1
SC	−0.002***	−0.005***	−0.000	−0.006***	−0.002*
	(−3.78)	(−4.33)	(−0.09)	(−5.09)	(−1.78)
SIZE	−0.001***	−0.001***	−0.002***	−0.000	−0.001***
	(−5.17)	(−2.96)	(−3.42)	(−0.92)	(−3.66)
LEV	0.017***	0.014***	0.025***	0.016***	0.024***
	(12.18)	(5.67)	(7.38)	(6.45)	(9.40)
Q	−0.001***	−0.000	−0.001***	−0.001**	−0.000
	(−3.16)	(−1.57)	(−2.92)	(−2.04)	(−0.50)
ROA	−0.026***	−0.027***	−0.029***	−0.027***	−0.015*
	(−6.32)	(−3.93)	(−2.87)	(−4.04)	(−1.90)
FIX	0.025***	0.024***	0.027***	0.027***	0.024***
	(21.02)	(12.30)	(9.36)	(14.02)	(9.98)
CGI	−0.000	0.000*	−0.000	−0.000	−0.000***
	(−1.44)	(1.69)	(−1.04)	(−0.06)	(−2.92)
AnaFollow	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***
	(−5.44)	(−2.77)	(−2.64)	(−3.12)	(−2.96)
Z-Score	−0.000**	−0.000***	0.000	−0.000	−0.000
	(−2.47)	(−2.69)	(0.54)	(−1.17)	(−1.46)
Intercept	0.054***	0.046***	0.071***	0.038***	0.047***
	(12.24)	(6.66)	(6.35)	(4.98)	(5.40)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.291	0.311	0.363	0.308	0.317
F-stat	77.36***	29.50***	21.27***	30.13***	23.04***
N	6313	2152	1138	2223	1618

Panel B: COD_2

	(1)	(2)	(3)	(4)	(5)
	Full Sample	Low Market	High Market	Low Trust	High Trust
Variable	COD_2	COD_2	COD_2	COD_2	COD_2
SC	−0.002*	−0.007***	0.002	−0.004*	−0.005
	(−1.92)	(−2.96)	(0.57)	(−1.81)	(−1.56)
SIZE	−0.001**	−0.001*	−0.003***	−0.002***	−0.002**
	(−2.45)	(−1.65)	(−3.05)	(−3.26)	(−2.45)
LEV	0.011***	0.017***	0.015**	0.019***	0.007
	(3.63)	(3.23)	(2.05)	(3.99)	(1.12)
Q	−0.000	−0.000	−0.001	−0.001	−0.001
	(−0.79)	(−0.24)	(−0.87)	(−1.13)	(−0.53)
ROA	−0.018**	−0.019	0.010	−0.006	0.021
	(−2.00)	(−1.17)	(0.48)	(−0.42)	(0.88)
FIX	0.006***	0.009**	−0.006	0.014***	−0.009
	(2.63)	(2.46)	(−1.11)	(3.99)	(−0.09)
CGI	−0.000*	−0.000**	0.000	−0.001***	−0.000
	(−1.66)	(−1.99)	(1.25)	(−3.61)	(−0.25)
AnaFollow	−0.000***	−0.000	−0.000***	−0.000*	−0.000*
	(−3.72)	(−1.32)	(−2.79)	(−1.65)	(−1.78)
Z-Score	0.001***	0.001***	0.000	0.001***	0.001
	(3.32)	(2.64)	(0.78)	(2.71)	(1.10)
Intercept	0.089***	0.088***	0.136***	0.110***	0.121***
	(10.88)	(6.79)	(6.67)	(7.83)	(7.20)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.070	0.067	0.136	0.092	0.055
F-stat	22.17***	7.62***	7.61***	10.01***	5.22***
N	5315	1826	960	1922	1329

Notes: This table presents the estimated results of the baseline regression models by using alternative measures for cost of debt. COD_1 = cost of debt, (interest charges + service charges + other financial expenses) scaled by the average of total liabilities in *t*–1 and *t*. COD_2 = Interest expenses reported in the income statement plus capitalized interest scaled by the interest-bearing liabilities. The first row (number) represents the estimated coefficient, and the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

Table 8
Examination after removing executive political affiliates.

	(1)	(2)	(3)	(4)	(5)
	COD	COD	COD	COD	COD
Variable	Full sample	Low Market	High Market	Low Trust	High Trust
SC	−0.003***	−0.004***	−0.001	−0.006***	−0.003**
	(−4.67)	(−3.24)	(−0.57)	(−4.80)	(−2.29)
SIZE	−0.000*	−0.000	−0.001*	−0.000	−0.000
	(−1.82)	(−0.49)	(−1.83)	(−0.33)	(−0.03)
LEV	0.019***	0.016***	0.027***	0.017***	0.024***
	(12.12)	(5.81)	(7.04)	(6.44)	(8.41)
ROA	−0.000**	−0.000	−0.001*	−0.001**	−0.000
	(−1.99)	(−1.36)	(−1.76)	(−1.98)	(−0.06)
Q	−0.026***	−0.030***	−0.035***	−0.022***	−0.017*
	(−5.81)	(−3.95)	(−3.24)	(−2.96)	(−1.92)
FIX	0.029***	0.032***	0.032***	0.032***	0.028***
	(21.29)	(14.21)	(9.93)	(14.71)	(9.95)
CGI	−0.000***	−0.000	−0.000	−0.000*	−0.001***
	(−2.93)	(−1.56)	(−0.97)	(−1.83)	(−3.74)
AnaFollow	−0.000***	−0.000*	−0.000*	−0.000**	−0.000***
	(−4.35)	(−1.73)	(−1.90)	(−1.99)	(−4.45)
Z-Score	−0.000*	−0.000	0.000	−0.000	−0.000
	(−1.82)	(−1.19)	(0.62)	(−0.71)	(−0.34)
Intercept	0.038***	0.029***	0.050***	0.035***	0.015
	(7.68)	(3.75)	(4.04)	(4.10)	(1.52)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.315	0.335	0.393	0.325	0.342
F-stat	68.42***	26.50***	18.48***	26.12***	21.93***
N	4990	1723	864	1773	1327

Notes: This table presents the estimated results of the baseline regression models removing executive political affiliates. COD = cost of debt, (interest charges + interest capitalized) scaled by the average of total liabilities in *t*–1 and *t*. The first row (number) represents the estimated coefficient, and the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

firms without political connections. Zhou (2009) argues that Chinese entrepreneurs actively participate in politics to increase their social capital and overcome legal and regulatory constraints. Li and Xie (2014) find political relationships in private enterprises can provide financing facilities. Enterprises that have local political relationships find it easier to obtain loans than those that do not. Table 8 presents the estimated results after removing the executives' political affiliates. The findings are consistent with the results in Table 3. We thus conclude that CEOs with affiliation to those with political backgrounds function similarly to CEOs without political capital.

Fifth, the measure of CEO social capital may be correlated to CEO human capital. Following Ferris et al. (2017), Ferris et al. (2019) and El-Khatib et al. (2015), we use excess social capital (ESC) to filter the human capital out of the CEO social capital measure. ESC is estimated as the residual from the regression of social capital on CEO human capital index, as an alternative measure of social capital. The index of CEO human capital is defined as the sum of the following dummy variables: (1) a dummy variable that takes the value of 1 if a CEO has academic experience in university or college, and 0 otherwise; (2) a dummy variable that takes the value of 1 if a CEO has a PhD degree, and 0 otherwise; (3) a dummy variable that takes the value of 1 if a CEO has legal experience, and 0 otherwise; (4) a dummy variable that takes the value of 1 if a CEO has finance experience, and 0 otherwise; (5) a dummy variable that takes the value of 1 if a CEO has a political position, and 0 otherwise; (6) a dummy variable that takes the value of 1 if a CEO has bank experience, and 0 otherwise. We re-regress all models of Eq. (1) accordingly. As shown in Table 9, the results are consistent with the findings in Table 3.

Sixth, we argue that a CEO may spend considerable time developing his or her social and political networks, therefore the social capital is intertwined with many CEO-specific characteristics, such as gender, age, tenure, and whether the CEO is the chair of the board, a family member, or the legal representative of the firm. It also depends on whether the CEO belongs to the founding family or is himself/herself the founder. Prior studies show divergent findings; for example, Anderson and Reeb (2003), Dyck and Zingales (2004) and Villalonga and Amit (2006) find that the family founding CEO lowers borrowing costs. La Porta et al. (1999) and Schulze et al. (2003) argue that family businesses may face agency costs and conflicts due to the entanglement of family relationships in business decisions, and that these conflicts can lead to increased perceived risk and potentially higher borrowing costs. Given this, we consider non-family versus family businesses, family founders, and CEO-specific characteristics. The results are presented in Panel A of Table 10. In Columns 1 and 2, the coefficient of SC is only significant in the subsample of non-family firms. Moreover, the coefficients for SC × Family (in Column 3) and Family (in Column 4) are significantly and positively related to the cost of debt. These findings align with the argument of La Porta et al. (1999) and Schulze et al. (2003).

Next, CEO social networks in the Chinese culture and corporate governance context are unique and differ from those of other developed economies, given the different history of these capital markets. CEOs of large firms are likely to have an advantage in

Table 9
Alternative measure for excess social capital.

	(1)	(2)	(3)	(4)	(5)
	Full Sample	Low Market	High Market	Low Trust	High Trust
Variable	COD	COD	COD	COD	COD
ESC	−0.003***	−0.005***	−0.000	−0.006***	−0.003**
	(−3.90)	(−4.05)	(−0.11)	(−5.07)	(−2.22)
SIZE	−0.000*	−0.000	−0.001**	0.000	−0.000
	(−1.68)	(−0.01)	(−2.21)	(0.33)	(−0.43)
LEV	0.017***	0.013***	0.024***	0.015***	0.024***
	(11.73)	(5.36)	(7.09)	(6.29)	(8.83)
Q	−0.000*	−0.000	−0.001**	−0.001*	0.000
	(−1.70)	(−0.92)	(−1.99)	(−1.75)	(0.69)
ROA	−0.031***	−0.031***	−0.042***	−0.027***	−0.021**
	(−7.46)	(−4.45)	(−4.18)	(−3.97)	(−2.49)
FIX	0.025***	0.025***	0.027***	0.027***	0.026***
	(20.49)	(12.29)	(9.31)	(13.63)	(10.19)
CGI	−0.000*	0.000	−0.000	−0.000	−0.000***
	(−1.71)	(0.57)	(−0.71)	(−0.28)	(−3.83)
AnaFollow	−0.000***	−0.000***	−0.000**	−0.000***	−0.000***
	(−6.44)	(−3.39)	(−2.23)	(−3.38)	(−3.85)
Z-Score	−0.000***	−0.000**	−0.000	−0.000	−0.000
	(−3.14)	(−2.55)	(−0.37)	(−1.60)	(−1.48)
Intercept	0.037***	0.025***	0.056***	0.028***	0.020**
	(8.42)	(3.46)	(5.10)	(3.62)	(2.22)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.290	0.307	0.374	0.312	0.317
F-stat	76.70***	28.99***	22.26***	30.66***	23.07***
N	6313	2152	1138	2223	1618

Notes: This table presents the estimated results of the baseline regression models by using alternative measure for social capital. ESC is calculated as the residual of excess social capital regression model (Ferris et al., 2017). The first row (number) represents the estimated coefficient, and the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

receiving financing from the banking system and their social and political contacts. For example, the Growth Enterprises Market (GEM) and the Main Board Market are two different segments of the stock market in China. They cater to companies of different sizes, stages of development, and regulatory requirements. Prior studies (e.g., Lin et al., 2013; Su et al., 2019) suggest that Main Board-listed firms may benefit from stronger investor protection mechanisms due to the higher regulatory standards, potentially attracting more risk-averse investors, while GEM-listed companies may be subject to higher volatility and risk perception. The results presented in Columns 1 and 2 of Panel B confirm this argument, indicating the coefficient of SC is only significant for the subsample of Main Board-listed firms. Moreover, we divided the full sample into state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs) because the extant literature (e.g., Li et al., 2017; Du and Schöttle, 2018) suggests that SOEs benefit from a perception of implicit government support due to their strategic importance and government ownership, which leads to lower perceived risk and consequently lower borrowing costs compared to non-SOEs. Consistently, as shown in Panel B, the coefficients for SOEs (in Column 4) and SC × SOE (in Column 5) are significantly and negatively related to cost of debt.

Finally, we use a time lag approach and the Heckman two-stage method to address endogeneity concerns. Brown et al. (2011) suggest that the use of lagged values can mitigate the endogeneity caused by inverse causality, such as a causal relationship between CEO social capital and cost of debt. We lag all explanatory variables one year. The results, presented in Table 11, are consistent with the primary findings in Table 3.

Our analyses of CEO social capital are restricted to firms where CEOs have three types of social capital: betweenness centrality, closeness centrality, and degree centrality, in regions with low level of marketization and social trust, which results in a potential sample selection bias. We implement two robustness methods using Heckman (1979) two-stage model to examine for sample selection bias.

For the first method, in the first stage, a probit regression is used to forecast the likelihood of a firm located in a region with a low degree of marketization and social trust, as shown in Columns 1 and 3 of Table 12. The dependent variables are LOWMAR and LOWTRU, coded 1 if a firm is in an area with a low degree of marketization and low social trust in year *t*, and 0 otherwise. We employ two instrumental variables: MARKET_LOW and TRUST_LOW, based on the bottom 33% quantile of the full sample. In the second stage, as shown in Columns 2 and 4, both coefficients of social capital are significantly and negatively related to cost of debt. The inverse Mills ratios (InvMill) calculated from the first-stage probit model are added to the second-stage model, and are not significant in Columns 2 and 4, related to cost of debt.

The sample selection bias may remain because CEOs with high social capital can self-select themselves into large firms that already have easy access to debt and a low cost of debt. In the second method, we employ a probit regression model, as shown in the first stage

Table 10
Additional analyses: CEO characteristics and firm types.

Panel A: Family founder and CEO specific characteristics

	(1)	(2)	(3)	(4)
	Non-Family	Family	SC × Family	CEO Charact
Variable	COD	COD	COD	COD
SC	−0.003***	−0.001	−0.004***	−0.002***
	(−3.64)	(−0.98)	(−4.43)	(−3.50)
Family			0.000	0.002***
			(0.17)	(4.96)
SC × Family			0.003***	
			(2.74)	
FamCEO				−0.001
				(−1.15)
LegalCEO				−0.001
				(−1.64)
CEOGender				0.001
				(1.59)
CEOAge				0.000
				(0.57)
CEOTenure				−0.001
				(−0.69)
CEODual				0.001*
				(1.79)
SIZE	−0.001	0.001**	−0.000	−0.000
	(−1.54)	(2.47)	(−1.17)	(−1.16)
LEV	0.017***	0.020***	0.017***	0.017***
	(9.59)	(8.20)	(12.02)	(12.04)
Q	−0.001**	0.000	−0.000	−0.000
	(−2.02)	(0.85)	(−1.59)	(−1.64)
ROA	−0.025***	−0.056***	−0.033***	−0.033***
	(−4.71)	(−8.06)	(−7.81)	(−7.84)
FIX	0.025***	0.024***	0.025***	0.025***
	(17.31)	(10.42)	(20.54)	(20.08)
CGI	−0.000*	0.000	−0.000	−0.000
	(−1.88)	(1.52)	(−0.92)	(−0.64)
AnaFollow	−0.000***	−0.000***	−0.000***	−0.000***
	(−5.48)	(−3.89)	(−6.48)	(−6.51)
Z-Score	−0.000	−0.000**	−0.000***	−0.000***
	(−1.26)	(−2.15)	(−2.93)	(−2.73)
Intercept	0.035***	0.013	0.035***	0.032***
	(6.52)	(1.51)	(7.76)	(6.86)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Adj. R^2	0.295	0.332	0.292	0.292
F-stat	49.80***	36.26***	73.41***	63.69***
N	3970	2343	6313	6227

Panel B: Firm types of breakdown

	(1)	(2)	(3)	(4)	(5)
	Main Board	GEM Board	Non-SOE	SOE	SC × SOE
Variable	COD	COD	COD	COD	COD
SC	−0.003***	0.002	−0.000	−0.005***	−0.000
	(−4.20)	(0.91)	(−0.52)	(−4.73)	(−0.14)
SOE					−0.000
					(−0.33)
SC × SOE					−0.005***
					(−4.46)
SIZE	−0.001*	0.001**	0.000	0.000	0.001
	(−1.93)	(2.17)	(0.77)	(0.82)	(0.10)
LEV	0.016***	0.027***	0.022***	0.013***	0.017***
	(10.67)	(5.23)	(11.52)	(5.89)	(12.25)
Q	−0.000**	0.000	−0.000	−0.000	−0.000
	(−2.29)	(1.05)	(−1.17)	(−0.40)	(−1.59)
ROA	−0.033***	−0.024*	−0.036***	−0.034***	−0.034***
	(−7.46)	(−1.71)	(−6.79)	(−4.98)	(−8.04)
FIX	0.025***	0.030***	0.026***	0.025***	0.025***

(*continued on next page*)

Table 10 (*continued*)

Panel B: Firm types of breakdown					
	(1)	(2)	(3)	(4)	(5)
	Main Board	GEM Board	Non-SOE	SOE	SC × SOE
Variable	COD	COD	COD	COD	COD
	(19.50)	(5.96)	(15.69)	(13.85)	(20.84)
CGI	−0.000**	0.001**	−0.000	−0.000	−0.000
	(−2.17)	(2.40)	(−0.51)	(−0.07)	(−0.13)
AnaFollow	−0.000***	−0.000	−0.000***	−0.000***	−0.000***
	(−6.15)	(−1.06)	(−4.81)	(−4.97)	(−6.73)
Z-Score	−0.000**	−0.000	−0.000**	−0.000	−0.000***
	(−2.71)	(−0.72)	(−2.03)	(−0.49)	(−2.75)
Intercept	0.041***	−0.028	0.023***	0.025***	0.029***
	(8.64)	(−1.26)	(3.40)	(3.74)	(6.43)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.293	0.189	0.319	0.283	0.298
F-stat	69.73***	65.49***	53.13***	32.21***	75.27***
N	5647	666	3780	2533	6313

Notes: Panel A of this table presents the estimated results of the data sets of non-family versus family in Columns 1 and 2, the interactive term of social capital and family founder in Column 3, and the baseline model with additional CEO specific characteristics in Column 4. Panel B presents the estimated results of the data sets of main board versus GEM board in Columns 1 and 2, non-SOE versus SOE in Columns 3 and 4, and the interactive term of social capital and SOE in Column 5. COD = cost of debt, (interest charges + interest capitalized) scaled by the average of total liabilities in *t*–1 and *t*. Family = family founder, is coded as 1 if the CEO belongs to the founding family or he/she is a founder, and 0 otherwise. FamCEO = family CEO, is coded as 1 if the CEO belongs to the family business, and 0 otherwise. LegalCEO = legal person CEO, is coded as 1 if the CEO is the legal person the firm, and 0 otherwise. CEOGender = CEO gender, is coded as if the CEO is a male, and 0 otherwise. CEOAge = the age of CEO. CEOTenure = number of years appointed as the CEO. CEODual = CEO duality, is coded as 1 if the CEO also acts as the chair of the board, and 0 otherwise. The first row (number) represents the estimated coefficient, and the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

in Column 5 to predict the likelihood of a CEO with high social. The dependent variable is HIGHSC, which indicates that CEO social capital is greater than the median value of the sample. In the second stage shown in Column 6, although InvMill is statistically significant, the coefficient of SC is negatively related to cost of debt, which is consistent with the results presented in Column 1 of Table 3. Thus, we confirm that the primary findings reported in Table 3 are not driven by an endogeneity problem.

5. Discussion

In a survey of the extant literature on corporate finance, we find that there are relatively few studies on the impact of executives' social capital on the cost of debt, particularly studies from China, where firms reply more heavily on debt financing for their operations compared with firms based in developed economies (Wu et al., 2020). This motivates us to raise three research questions. First, we argue that CEO social contributes to obtaining a low cost for their firm's debt financing. Second, we expect that the impact of CEO social capital is more pronounced in regions with a low level of marketization or social trust than in regions with a high level of marketization or social trust. Third, we posit that information asymmetry mediates the relationship between CEO social capital and cost of debt.

Our findings are threefold: (1) consistent with our theoretical framework, we find that CEO social capital decreases a firm's cost of debt; (2) the effect of CEO social capital is more pronounced in regions with a low degree of marketization or a low degree of social trust than in regions with a high degree of marketization or a high degree of social trust; (3) discretionary accruals positively mediate the impact of CEO social capital, while information disclosure quality has a negative mediating effect on the identified relationship.

Our results are in contrast to prior studies. For example, Fracassi and Tate (2012) document that well-connected CEOs pursue acquisitions that destroy value. El-Khatib et al. (2015) find that CEOs with higher network centrality can efficiently gather and control private information, and use their social capital to increase entrenchment and reap private benefits to engage in more value-destroying acquisitions. Ishii and Xuan (2014) investigate the effect of social links between acquirers and target firms on merger performance and find that the social connection between directors and senior executives of the acquiring and the target firms has a significantly negative effect on abnormal returns.

6. Conclusion

This study investigates the relationship between CEO's social capital and cost of debt. We posit that CEO's social capital offers incentives for CEOs to provide enhanced information transparency and quality, which lowers the monitoring costs for the borrowers, inducing reduced cost of debt. Additionally, CEO's social capital creates a sense of trust between the lenders and the borrowers due to the informal tie that social capital creates among the networks. Using a unique dataset consisting with 6313 firm-year observations

Table 11
Time lag effect.

	(1)	(2)	(3)	(4)	(5)
	Full Sample	Low Market	High Market	Low Trust	High Trust
Variable	COD	COD	COD	COD	COD
SC_{t-1}	−0.003***	−0.005***	−0.000	−0.007***	−0.004**
	(−3.14)	(−3.62)	(−0.23)	(−4.58)	(−2.17)
$SIZE_{t-1}$	−0.000	−0.000	−0.002**	0.000	−0.000
	(−1.21)	(−0.17)	(−2.39)	(0.05)	(−0.11)
LEV_{t-1}	0.016***	0.011***	0.030***	0.017***	0.020***
	(8.56)	(3.29)	(6.58)	(5.04)	(5.81)
Q_{t-1}	−0.000	0.000	−0.001***	−0.000	0.001
	(−0.16)	(0.02)	(−2.65)	(−0.44)	(1.46)
ROA_{t-1}	−0.030***	−0.038***	−0.022	−0.023**	−0.036***
	(−5.25)	(−4.01)	(−1.55)	(−2.47)	(−2.95)
FIX_{t-1}	0.024***	0.024***	0.024***	0.028***	0.020***
	(14.92)	(9.34)	(6.28)	(10.86)	(6.33)
CGI_{t-1}	−0.000**	−0.000	−0.000	−0.000	−0.000**
	(−2.26)	(−0.04)	(−1.28)	(−0.62)	(−2.33)
$AnaFollow_{t-1}$	−0.000***	−0.000***	0.000	−0.000***	−0.000***
	(−5.41)	(−3.04)	(0.23)	(−3.56)	(−3.35)
$Z\text{-}Score_{t-1}$	−0.000***	−0.001***	−0.000	−0.000*	−0.000***
	(−3.93)	(−3.70)	(−0.43)	(−1.90)	(−2.78)
Intercept	0.027***	0.019**	0.050***	0.018*	0.010
	(4.63)	(2.03)	(3.25)	(1.76)	(0.79)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.274	0.331	0.365	0.313	0.321
F-stat	41.97***	19.98***	13.51***	19.29***	14.34***
N	3577	1190	653	1248	903

Notes: This table presents the estimated results of the baseline regression models controlling time lag. COD = cost of debt, (interest charges + interest capitalized) scaled by the average of total liabilities in *t*–1 and *t*. The first row (number) represents the estimated coefficient, and the second row (number in parentheses) represents the *t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

from the firms listed on the Shanghai and Shenzhen Stock Exchange markets from 2008 to 2017, our results suggest that CEO's social capital reduces cost of debt in the context of China, and such effect is more pronounced when there is a lack of information verification from the regulators (i.e., marketization) and societal norm (i.e., social trust). Moreover, we find that CEO's social capital reduces cost of debt through the path of reduced discretionary accruals and information disclosure quality. Our results hold after a battery of robustness checks, including the three individual proxies (betweenness centrality, closeness centrality and degree centrality) for CEO social capital, the two alternative proxies for cost of debt, sample without political capital, excess social capital, the consideration of family business characteristics, the interactive effect of state-owned enterprises and endogeneity concerns.

Our study contributes to the literature in the following ways. Theoretically, we provide an in-depth analysis of the impact of CEO social capital on the cost of debt, grounded in a robust theoretical framework. Drawing on social capital theory, which underscores the inherent value of social ties, norms, and trust in fostering cooperation, we argue that organizations stand to benefit from the connections of CEOs. Building on network theory, we investigate how the centrality of social capital within a network influences the cost of debt. Our findings diverge from prior studies by Fracassi and Tate (2012), Ishii and Xuan (2014), and El-Khatib et al. (2015), revealing that a CEO's social capital effectively reduces their firm's cost of debt. Additionally, we enhance the understanding of this association by incorporating information asymmetry theory, demonstrating that the social capital of executives diminishes information asymmetry, thereby influencing the cost of debt.

Practically, our study responds to the evolving landscape of social capital research, as advocated by Fogel et al. (2018). We go beyond bilateral connections and consider the broader network of interpersonal relationships, capturing the effects of social capital among all members rather than just those with direct connections. By measuring CEO social capital within the multivariate network of interpersonal relationships, we explore its relationship with the cost of corporate debt capital in the Chinese context. This approach extends corporate finance research by incorporating the dynamics of this informal social mechanism, providing a nuanced understanding of its implications for the cost of debt in practical business scenarios. Anecdotal evidence suggests monitoring a CEO's social media activity can help identify potential risks to the company's reputation. If a CEO engages in controversial discussions or shares content that goes against the company's values, it may prompt governance bodies to address these issues and consider the impact on the organization. For example, the recent resignation of Dongxu Sun, the CEO of East Buy Holding Ltd., regarding employee's benefit and stakeholder's violations.

Our findings have two important implications for corporate decision-makers in China. First, enterprises, especially micro-, small- and medium-sized enterprises in regions with low levels of marketization and social trust can examine executives' personal social networks when recruiting senior management staff. Senior executives with large social networks are more likely to reduce the

Table 12
Heckman two-stage model.

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	LOWMAR	COD	LOWTRU	COD	HIGHSC	COD
	First-stage	Second-stage	First-stage	Second-stage	First-stage	Second-stage
SC		−0.002***		−0.002***		−0.002***
		(−3.75)		(−3.73)		(−3.78)
SIZE	0.148***	−0.002*	−0.058***	−0.000	0.183***	−0.002***
	(7.24)	(−1.78)	(−2.82)	(−0.36)	(8.83)	(−3.05)
LEV	0.077	0.016***	1.097***	0.013	0.257*	0.015***
	(0.55)	(9.95)	(7.86)	(1.40)	(1.84)	(9.13)
ROA	0.064***	−0.001*	−0.023	−0.000	1.437***	−0.044***
	(3.84)	(−1.96)	(−1.39)	(−0.81)	(3.42)	(−6.89)
Q	−2.383***	−0.004	−0.797*	−0.029***	−0.030*	−0.000
	(−5.76)	(−0.21)	(−1.94)	(−3.66)	(−1.94)	(0.13)
FIX	−0.045	0.026***	0.448***	0.024***	0.167	0.024***
	(−0.37)	(20.04)	(3.78)	(5.90)	(1.38)	(18.44)
CGI	0.038***	−0.001*	0.033***	−0.000	0.034***	−0.000***
	(6.50)	(−1.80)	(5.74)	(−0.68)	(5.75)	(−3.11)
AnaFollow	−0.001	−0.000***	0.001	−0.000***	−0.002	−0.000***
	(−0.22)	(−6.08)	(0.42)	(−6.15)	(−0.82)	(−5.17)
Z-Score	−0.001	−0.000***	0.021***	−0.000	−0.002	−0.000***
	(−0.10)	(−2.99)	(3.31)	(−1.35)	(−0.31)	(−2.77)
InvMill		−0.017		−0.004		−0.012***
		(−1.49)		(−0.33)		(−2.59)
Intercept	−3.458***	0.090**	0.724*	0.039***	−3.778***	0.073***
	(−7.95)	(2.54)	(1.66)	(6.48)	(−8.51)	(5.06)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R^2		0.289		0.289		0.290
LR χ^2/F-stat	477.66***	76.58***	481.13***	74.45***	1073.70***	74.71***
N	6309	6309	6313	6313	6313	6313

Notes: This table presents the results of Heckman two–stage model. Column 1 presents the first-stage regression using LOWMAR as the dependent variable, which indicates that firm locates in the region with low marketization index. Column 3 presents the first-stage regression using LOWTRU as the dependent variable, which indicates that firm locates in the region with low social trust index. Column 5 presents the first-stage regression using HIGHSC as the dependent variable, which indicates that CEO social capital is greater than the median value of the sample. Columns 2, 4 and 6 present the second-stage regression with the measure for cost of debt (COD) as the dependent variables. COD = cost of debt, (interest charges + interest capitalized) scaled by the average of total liabilities in *t*–1 and *t*.. The first row (number) represents the estimated coefficient, and the second row (number in parentheses) represents the *z*/*t*-value of significance. We winsorized all continuous variables at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. The definitions of all variables are provided in Appendix A. *, **, *** denote significance at the 10%, 5%, and 1% level respectively.

information asymmetry between their firms and the outside world, and help their firms obtain low-cost debt financing. Second, the higher the social capital of executives, the better the quality of the firm's information disclosure. However, the accumulation of social capital by senior management may result in corporate violations (Khanna et al., 2015). Therefore, we recommend that the government establishes and improves laws and regulations that enhance the construction of social credit reporting systems and promote the balanced development of marketization and social trust levels in China's various regions. Legal enforcement and financial regulatory agencies should consider the social networks of executives to help companies solve the problems they face in their financing processes and guide corporate executives to use their social capital ethically.

This study has three limitations. First, our result indicates a positive consequence, suggesting that a CEO's social capital lowers their firm's cost of debt. However, this finding is only effective in the Chinese setting where the market is dominated by SOEs, thus it cannot be generalized to other jurisdictions. Future research could examine more strategic implications of CEO social capital in other economies. Second, our data ended in 2017, due to the limit for collection of senior executives' social network characteristics. Future research could extend the study beyond 2017 when these data become available. Third, our result cannot confirm the case in China where social and political connections are needed to receive finance from government banks and financial institutions because of the data limit. Future research could address this limitation.

CRediT authorship contribution statement

Yiping Chen: Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. **Yuan George Shan:** Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. **Jimin Wang:** Formal analysis, Methodology, Writing – review & editing. **Xinxin Yang:** Data curation, Formal analysis, Methodology. **Junru Zhang:** Conceptualization, Methodology, Writing – review & editing.

Declaration of competing interest

The authors declare no conflict of interest.

Data availability

CEO social capital (Original data) (UWA Profile and Research Repository)

Acknowledgements

The authors appreciate the constructive comments provided by the three anonymous reviewers, Associate Editor, and Professor Jonathan Batten of RMIT University. The authors also acknowledge the constructive comments on earlier versions of this paper received from the 2021 Financial Markets and Corporate Governance Conference (FMCG), the 2021 British Accounting and Finance Association Annual Conference (BAFA), and the 2021 Accounting & Finance Association of Australia and New Zealand (AFAANZ) Conference.

Appendix A. Variable definition

Variable	Definition	Data source
Cost of debt variables (Dependent)		
Cost of debt (COD)	Interest expenses reported in the income statement plus capitalized interest scaled by the average total liabilities in *t*–1 and *t* (Zou and Adams, 2008; Lim et al., 2018).	Wind
Cost of debt (COD_1)	Interest expenses reported in the income statement plus service charges and other financial expenses scaled by the average of total liabilities in *t*–1 and *t* (Jiang, 2009; Ni et al., 2019).	Wind
Cost of debt (COD_2)	Interest expenses reported in the income statement plus capitalized interest scaled by the interest-bearing liabilities.	Wind
Social capital measures (Independent)		
Betweenness centrality (SC_B)	The number of shortest paths connecting any other two nodes through a certain node, which means how often the CEO is on the shortest path between two executives (El-Khatib et al., 2015): $SC\_B_k = \sum_{i<j\neq k\in N} \frac{g_{ij(k)}/g_{ij}}{(n-1)(n-2)/2}$ where g_{ij} is assigned 1 for any geodesic connecting *i* and *j*, and $g_{ij(k)}$ is assigned a value of 1 if the geodesic between *i* and *j* also passes through *k*.	All the origin values are derived from CSMAR. The measures for CEO network centrality are computed via Python.
Closeness centrality (SC_C)	The average of shortest distances between a node and all other nodes, reflects the efficiency of information sharing within the CEO and other executives (El-Khatib et al., 2015): $SC\_C_i = \frac{n-1}{\sum_{i\neq j\in N} d_{ij}} \times \frac{n}{N}$ where d_{ij} represents the shortest distance between nodes *i* and *j*, *n* is the size of the component *i* belongs to, and *N* is the size of the yearly network.	
Degree centrality (SC_D)	The number of nodes directly connected to a certain node, reflects the size of the CEO personal network (El-Khatib et al., 2015): $SC\_D_i = \sum_{j\neq i} x_{ij}$ where x_{ij} is assigned 1 for the presence of a social connection between *i* and *j*.	
Overall CEO social capital (SC)	The average of the percentile values of the sum of betweenness centrality (SC_B), closeness centrality (SC_C) and degree centrality (SC_D) as the overall CEO social capital (SC).	
Marketization and social trust		
Marketization (Low/High Market)	The region of low marketization indicates the bottom 33% of the index, and the region of high marketization indicates the top 36% of the index.	Liu et al. (2016).
Social trust (Low/High Trust)	The low social trust represents the region is in the bottom 33% of the index, and the high social trust represents the region is in the top 33% of the index.	Zhang and Ke (2003),
Information asymmetry proxies (Mediator)		
Discretionary accruals (DA)	The absolute value of accrued earnings management which calculated of modified Jones (1991) model (Dechow et al., 1995; Guay et al., 1996; Bartov et al., 2000)	CSMAR

(*continued on next page*)

(*continued*)

Variable	Definition	Data source
Information disclosure quality (IDQ)	The information quality is an ordinal variable that equals to 1, 2, 3, and 4 if firm's information quality (IDQ) rating is D, C, B, A respectively in the Shenzhen Stock Exchange.	Shenzhen Stock Exchange
Firm-Level Control Variables		
Leverage (LEV)	The ratio of total liability to total assets	CSMAR
Firm size (SIZE)	The natural logarithm of the book value of total assets	CSMAR
Return on assets (ROA)	The ratio of income before extraordinary items to total assets	CSMAR
Tobin's Q (Q)	The ratio of market value to the replacement costs of its assets	CSMAR
Fixed asset intensity (FIX)	The ratio of net fixed assets to total assets	CSMAR
CGI	The overall index of firm internal governance, which is constructed by Wu et al. (2020).	CSMAR
AnaFollow	The number of analysts (teams) that track the company in year *t*	CSMAR
Z-Score	Z–score represents financial distress risk, which is calculated as the method used in Altman (1968).	CSMAR

References

Aldamen, H., Duncan, K., 2012. Does adopting good corporate governance impact the cost of intermediated and non-intermediated debt? Account. Finance 52, 49–76.
Allen, F., Qian, J., Qian, M.J., 2005. Law, finance, and economic growth in China. J. Financ. Econ. 77, 57–116. https://doi.org/10.1016/j.jfineco.2004.06.010.
Altman, E.I., 1968. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. J. Financ. 23, 589–609.
Anderson, R.C., Reeb, D.M., 2003. Founding-family ownership and firm performance: evidence from the S&P 500. J. Financ. 58 (3), 1301–1328.
Anderson, R.C., Mansi, S.A., Reeb, D.M., 2004. Board characteristics, accounting report integrity, and the cost of debt. J. Account. Econ. 37, 315–342.
Ang, J.S., Cheng, Y., Wu, C., 2015. Trust, investment, and business contracting. J. Financ. Quant. Anal. 50, 569–595.
Ashbaugh-Skaife, H., Collins, D.W., LaFond, R., 2006. The effects of corporate governance on firms' credit ratings. J. Account. Econ. 42, 203–243.
Ayyagari, M., Demirgüç-Kunt, A., Maksimovic, V., 2010. Formal versus informal finance: evidence from China. Rev. Financ. Stud. 23, 3048–3097.
Barney, J., 1991. Firm resources and sustained competitive advantage. J. Manag. 17 (1), 99–120.
Baron, R.M., Kenny, D.A., 1986. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J. Pers. Soc. Psychol. 51, 1173–1182.
Barron, O.E., Qu, H., 2014. Information asymmetry and the ex ante impact of public disclosure quality on price efficiency and the cost of capital: evidence from a laboratory market. Account. Rev. 89, 1269–1297.
Bartov, E., Gul, F.A., Tsui, J.S., 2000. Discretionary-accruals models and audit qualifications. J. Account. Econ. 30, 421–452.
Ben-Horim, M., Callen, J.L., 1989. The cost of capital, Macaulay's duration, and Tobin's q. J. Financ. Res. 12, 143–156.
Berger, A.N., Udell, G.F., 1994. Did risk-based capital allocate bank credit and cause a "credit crunch" in the United States? J. Money Credit Bank. 26, 585–628.
Bhojraj, S., Sengupta, P., 2003. Effect of corporate governance on bond ratings and yields: the role of institutional investors and outside directors. J. Bus. 76, 455–475.
Bian, Y., 2019. Guanxi, How China Works. John Wiley & Sons.
Bian, Y., Qiu, H., 2000. The social capital of enterprises and its efficiency. Soc. Sci. China 2, 87–99 (In Chinese).
Bonacich, P., 1972. Factoring and weighting approaches to status scores and clique identification. J. Math. Sociol. 2, 113–120. https://doi.org/10.1080/0022250x.1972.9989806.
Boubakri, N., Guedhami, O., Mishra, D., Saffar, W., 2012. Political connections and the cost of equity capital. Finance 18, 541–559.
Bourdieu, P., 1986. The forms of capital. In: Richardson, J. (Ed.), Handbook of Theory and Research for the Sociology of Education. Greenwood, Westport, CT, pp. 241–258.
Bradley, M., Chen, D., 2011. Corporate governance and the cost of debt: evidence from director limited liability and indemnification provisions. Finance 17, 83–107.
Brockman, P., Firth, M., He, X.J., Mao, X.Y., Rui, O., 2019. Relationship-based resource allocations: evidence from the use of "Guanxi" during SEOs. J. Financ. Quant. Anal. 54, 1193–1230. https://doi.org/10.1017/S0022109018000807.
Brown, P., Beekes, W., Verhoeven, P., 2011. Corporate governance, accounting and finance: a review. Account. Finance 51, 96–172.
Cai, R., Zhang, X., Wang, H., 2016. Bidirectional recurrent convolutional neural network for relation classification. In: Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics, Volume 1: Long Papers, pp. 756–765.
Cao, Q., Simsek, Z., Jansen, J.J., 2015. CEO social capital and entrepreneurial orientation of the firm: bonding and bridging effects. J. Manag. 41 (7), 1957–1981.
Chauhan, Y., Jaiswall, M., Goyal, V., 2022. Does societal trust affect corporate capital structure? Emerg. Mark. Rev. 51, 1–16.
Chen, D., Liu, X., Wang, C., 2016. Social trust and bank loan financing: evidence from China. Abacus 52, 374–403.
China Statistical Yearbook, 2022. Available from: https://www.stats.gov.cn/sj/ndsj/2022/indexeh.htm.
Chowdhury, A., Mollah, S., Al Farooque, O., 2018. Insider-trading, discretionary accruals and information asymmetry. Br. Account. Rev. 50, 341–363.
Coleman, J.S., 1988. Social capital in the creation of human capital. Am. J. Sociol. 94, S95–S120. https://doi.org/10.1086/228943.
Cormier, D., Houle, S., Ledoux, M.J., 2013. The incidence of earnings management on information asymmetry in an uncertain environment: some Canadian evidence. J. Int. Account. Audit. Tax. 22, 26–38.
Dasgupta, P., 2005. Economics of social capital. Econ. Rec. 81, S2–S21.
Dechow, P.M., Sloan, R.G., Sweeney, A.P., 1995. Detecting earnings management. Account. Rev. 70, 193–225.
Derrien, F., Kecskés, A., Mansi, S.A., 2016. Information asymmetry, the cost of debt, and credit events: evidence from quasi-random analyst disappearances. Finance 39, 295–311.
Desender, K.A., Aguilera, R.V., López puertas-Lamy, M., Crespi, R., 2016. A clash of governance logics: foreign ownership and board monitoring. Strateg. Manag. J. 37, 349–369.
Dhaliwal, D.S., Gleason, C.A., Heitzman, S., Melendrez, K.D., 2008. Auditor fees and cost of debt. J. Acc. Audit. Financ. 23, 1–22.
Diamond, D.W., 1989. Reputation acquisition in debt markets. J. Polit. Econ. 97, 828–862.
Du, L., Schöttle, I., 2018. The risk perception of state ownership and its impact on borrowing costs. Finance 48, 1–22.
Du, J., Guariglia, A., Newman, A., 2015. Do social capital building strategies influence the financing behavior of Chinese private small and medium–sized enterprises? Entrep. Theory Pract. 39 (3), 601–631.
Dyck, A., Zingales, L., 2004. Private benefits of control: an international comparison. J. Financ. 59 (2), 537–600.

El-Khatib, R., Fogel, K., Jandik, T., 2015. CEO network centrality and merger performance. J. Financ. Econ. 116, 349–382. https://doi.org/10.1016/j.jfineco.2015.01.001.
Engelberg, J., Gao, P.J., Parsons, C.A., 2012. Friends with money. J. Financ. Econ. 103, 169–188. https://doi.org/10.1016/j.jfineco.2011.08.003.
Engelberg, J., Gao, P.J., Parsons, C.A., 2013. The price of a CEO's rolodex. Rev. Financ. Stud. 26, 79–114. https://doi.org/10.1093/rfs/hhs114.
Faccio, M., 2006. Politically connected firms. Am. Econ. Rev. 96, 369–386.
Fafchamps, M., 2006. Development and social capital. J. Dev. Stud. 42, 1180–1198.
Faleye, O., Kovacs, T., Venkateswaran, A., 2014. Do better-connected CEOs innovate more? J. Financ. Quant. Anal. 49, 1201–1225.
Fan, G., Wang, X., Zhu, H., 2011. NERI Index of Marketization of China's Provinces 2011 Report. Economic Science Press, Beijing.
Faulkender, M., Petersen, M.A., 2006. Does the source of capital affect capital structure? Rev. Financ. Stud. 19, 45–79.
Fei, X.T., 1948. From the Soil: The Foundations of Chinese Society. Phoenix Press, Hong Kong.
Fernández-Pérez, V., García-Morales, V.J., Pullés, D.C., 2016. Entrepreneurial decision-making, external social networks and strategic flexibility: the role of CEOs' cognition. Eur. Manag. J. 34, 296–309.
Ferrer, E., Santamaría, R., Suárez, N., 2019. Does analyst information influence the cost of debt? Some international evidence. Int. Rev. Econ. Financ. 64, 323–342.
Ferris, S.P., Javakhadze, D., Rajkovic, T., 2017. CEO social capital, risk-taking and corporate policies. Finance 47, 46–71. https://doi.org/10.1016/j.jcorpfin.2017.09.003.
Ferris, S.P., Javakhadze, D., Rajkovic, T., 2019. An international analysis of CEO social capital and corporate risk-taking. Eur. Financ. Manag. 25, 3–37. https://doi.org/10.1111/eufm.12156.
Ferris, S.P., Javakhadze, D., Liu, Y., 2020. The price of boardroom social capital: the effects of corporate demand for external connectivity. J. Bank. Financ. 111, 105729 https://doi.org/10.1016/j.jbankfin.2019.105729.
Fischer, H.M., Pollock, T.G., 2004. Effects of social capital and power on surviving transformational change: the case of initial public offerings. Acad. Manag. J. 47 (4), 463–481.
Fogel, K., Jandik, T., McCumber, W.R., 2018. CFO social capital and private debt. Finance 52, 28–52. https://doi.org/10.1016/j.jcorpfin.2018.07.001.
Fracassi, C., 2017. Corporate finance policies and social networks. Manag. Sci. 63, 2420–2438. https://doi.org/10.1287/mnsc.2016.2433.
Fracassi, C., Tate, G., 2012. External networking and internal firm governance. J. Financ. 67, 153–194. https://doi.org/10.1111/j.1540-6261.2011.01706.x.
Freedman, S., Jin, G.Z., 2017. The information value of online social networks: lessons from peer-to-peer lending. Int. J. Ind. Organ. 51, 185–222. https://doi.org/10.1016/j.ijindorg.2016.09.002.
Freeman, L.C., 1977. Set of measures of centrality based on betweenness. Sociometry 40, 35–41. https://doi.org/10.2307/3033543.
Fukuyama, F., 1996. Trust: The Social Virtues and the Creation of Prosperity, vol. 99. Simon & Schuster, New York.
Godlewski, C.J., Sanditov, B., Burger-Helmchen, T., 2012. Bank lending networks, experience, reputation, and borrowing costs: empirical evidence from the French syndicated lending market. J. Bus. Financ. Acc. 39, 113–140.
Gordon, L.A., Myers, M.D., 1998. Tobin's Q and overinvestment. Appl. Econ. Lett. 5, 1–4.
Guay, W.R., Kothari, S.P., Watts, R.L., 1996. A market-based evaluation of discretionary accrual models. J. Account. Res. 34, 83–105.
Gujarati, D.N., 2003. Basic Econometrics. McGraw-Hill, New York.
Gul, F.A., Tsui, J.S.L., 1997. A test of the free cash flow and debt monitoring hypotheses: evidence from audit pricing. J. Account. Econ. 24, 219–237.
Guo, J., Li, C., Jiao, W., Wang, Z., 2021. Marketisation, information transparency and the cost of equity for family firms. Financ. Res. Lett. 38, 101394.
Heckman, J.J., 1979. Sample selection bias as a specification error. Econometrica 47, 153–162.
Hoi, C.K.S., Wu, Q., Zhang, H., 2019. Does social capital mitigate agency problems? Evidence from chief executive officer (CEO) compensation. J. Financ. Econ. 133, 498–519. https://doi.org/10.1037/0022-3514.51.6.1173.
Horton, J., Millo, Y., Serafeim, G., 2012. Resources or power? Implications of social networks on compensation and firm performance. J. Bus. Financ. Acc. 39 (3–4), 399–426.
Huang, K., Shang, C.G., 2019. Leverage, debt maturity, and social capital. Finance 54, 26–46. https://doi.org/10.1016/j.jcorpfin.2018.11.001.
Hwang, B.H., Kim, S., 2009. It pays to have friends. J. Financ. Econ. 93, 138–158. https://doi.org/10.1016/j.jfineco.2008.07.005.
Ishii, J., Xuan, Y.H., 2014. Acquirer-target social ties and merger outcomes. J. Financ. Econ. 112, 344–363. https://doi.org/10.1016/j.jfineco.2014.02.007.
Jha, A., 2019. Financial reports and social capital. J. Bus. Ethics 155, 567–596.
Jiang, Y., 2009. Cost of equity, cost of debt and corporate governance: a study of difference in influence. Manag. World 11, 144–155 (In Chinese).
Jin, J.Y., Kanagaretnam, K., Liu, Y., Liu, N., 2019. Banks' loan growth, loan quality, and social capital. J. Behav. Exp. Financ. 21, 83–102. https://doi.org/10.1016/j.jbef.2018.11.004.
Jones, J.J., 1991. Earnings management during import relief investigations. J. Account. Res. 29, 193–228.
Kaplan, S.N., Zingales, L., 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints? Q. J. Econ. 112, 169–215.
Karolyi, S.A., 2018. Personal lending relationships. J. Financ. 73, 5–49. https://doi.org/10.1111/jofi.12589.
Khanna, V., Kim, E., Lu, Y., 2015. CEO connectedness and corporate fraud. J. Financ. 70, 1203–1252.
Kirkbesoglu, E., 2013. The impact of social capital on managerial reputation. Procedia Soc. Behav. Sci. 99, 439–445. https://doi.org/10.1016/j.sbspro.2013.10.512.
Klock, M.S., Mansi, S.A., Maxwell, W.F., 2005. Does corporate governance matter to bondholders? J. Financ. Quant. Anal. 40, 693–719.
Knack, S., Keefer, P., 1997. Does social capital have an economic payoff, a cross-country investigation? Q. J. Econ. 112, 1251–1288. https://doi.org/10.1162/003355300555475.
Kolev, K.D., Wangrow, D.B., Barker III, V.L., Schepker, D.J., 2019. Board committees in corporate governance: a cross-disciplinary review and agenda for the future. J. Manag. Stud. 56 (6), 1138–1193.
Kuhnen, C.M., 2009. Business networks, corporate governance, and contracting in the mutual fund industry. J. Financ. 64, 2185–2220.
La Porta, R.F., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1997. Trust in large organizations. Am. Econ. Rev. 87, 333–338.
La Porta, R.F., Lopez-de-Silanes, F., Shleifer, A., 1999. Corporate ownership around the world. J. Financ. 54 (2), 471–517.
Lang, M.H., Lins, K.V., Miller, D.P., 2004. Concentrated control, analyst following, and valuation: do analysts matter most when investors are protected least? J. Account. Res. 42, 589–623. https://doi.org/10.1111/j.1475-679X.2004.t01-1-00142.x.
Larcker, D.F., So, E.C., Wang, C.C.Y., 2013. Boardroom centrality and stock returns. J. Account. Econ. 55, 225–250.
Li, S., Xie, X., 2014. Corporate social responsibility, political relationship and debt financing of private enterprises: evidence from Chinese capital market. Nankai Business Rev. 17, 30–40 (In Chinese).
Li, K., Meng, L., Wang, Q., 2017. State ownership and credit risk: evidence from China. Finance 42, 75–91.
Li, X., Luo, J., Chan, K.C., 2018. Political uncertainty and the cost of equity capital. Financ. Res. Lett. 26, 215–222.
Lim, C.Y., Wang, J., Zeng, C., 2018. China's "mercantilist" government subsidies, the cost of debt and firm performance. J. Bank. Financ. 86, 37–52.
Lin, Y.C., Peasnell, K.V., 2000. Fixed asset revaluation and equity depletion in the UK. J. Bus. Financ. Acc. 27, 359–394.
Lin, M.F., Prabhala, N.R., Viswanathan, S., 2013. Judging borrowers by the company they keep: friendship networks and information asymmetry in online peer-to-peer lending. Manag. Sci. 59, 17–35. https://doi.org/10.1287/mnsc.1120.1560.
Liu, T., Cao, G., Yan, Y., Wang, R.Y., 2016. Urban land marketization in China: central policy, local initiative, and market mechanism. Land Use Policy 57, 265–276.
Liu, C., Xu, L., Yang, H., Zhang, W., 2023. Prosocial CEOs and the cost of debt: evidence from syndicated loan contracts. Finance 78, 102316. https://doi.org/10.1016/j.jcorpfin.2022.102316.
Lorca, C., Sánchez-Ballesta, J.P., García-Meca, E., 2011. Board effectiveness and cost of debt. J. Bus. Ethics 100, 613–631.
Mansi, S.A., Maxwell, W.F., Miller, D.P., 2011. Analyst forecast characteristics and the cost of debt. Rev. Acc. Stud. 16, 116–142.
Myers, S.C., Majluf, N.S., 1984. Corporate financing and investment decisions when firms have information that investors do not have. J. Financ. Econ. 13 (2), 187–221.

Nagar, V., Schoenfeld, J., Wellman, L., 2019. The effect of economic policy uncertainty on investor information asymmetry and management disclosures. J. Account. Econ. 67, 36–57. https://doi.org/10.1016/j.jacceco.2018.08.011.
Nguyen, B.D., 2012. Does the rolodex matter? Corporate elite's small world and the effectiveness of boards of directors. Manag. Sci. 58, 236–252.
Ni, J., Peng, K., Hu, Y., 2019. The role of "social people" in interlock directors and debt financing costs. China Soft Sci. 2, 93–109 (In Chinese).
Panta, H., 2020. Does social capital influence corporate risk-taking? J. Behav. Exp. Financ. 26, 100301.
Platteau, J.P., 1994a. Behind the market stage where real societies exist–Part I: the role of public and private order institutions. J. Dev. Stud. 30, 533–577.
Platteau, J.P., 1994b. Behind the market stage where real societies exist–Part II: the role of moral norms. J. Dev. Stud. 30, 753–817.
Portes, A., 1998. Social capital: its origins and applications in modern sociology. Annu. Rev. Sociol. 24, 1–24.
Pret, T., Carter, S., 2017. The importance of 'fitting in': collaboration and social value creation in response to community norms and expectations. Entrep. Reg. Dev. 29 (7–8), 639–667.
Proctor, C.H., Loomis, C.P., 1951. Analysis of socioeconomic data. In: Holland, P.W., Leinhardt, S. (Eds.), Research Methods in Social Relations. Dryden Press, New York, pp. 561–586.
Putnam, R.D., 1993. Prosperous community: social capital and public life. Am. Prospect. 13, 35–42.
Putnam, R.D., 1995. Tuning in, tuning out-the strange disappearance of social capital in America. *PS*. Polit. Sci. Polit. 28, 664–683. https://doi.org/10.2307/420517.
Putnam, R.D., 2000. Bowling Alone: The Collapse and Revival of American Community. Simon and Schuster.
Putnam, R.D., 2001. Social capital: Measurement and consequences. Can. J. Policy Res. 2, 41–51.
Rajan, R.G., Zingales, L., 1995. What do we know about capital structure? Some evidence from international data. J. Financ. 50, 1421–1460.
Reeb, D.M., Mansi, S.A., Allee, J.M., 2001. Firm internationalization and the cost of debt financing: evidence from non-provisional publicly traded debt. J. Financ. Quant. Anal. 36, 395–414.
Renders, A., Gaeremynck, A., 2012. Corporate governance, principal-principal agency conflicts, and firm value in European listed companies. Corp. Gov. 20 (2), 125–143.
Sabidussi, G., 1966. The centrality index of a graph. Psychometrika 31, 581–603. https://doi.org/10.1007/BF02289527.
Schoenherr, D., 2019. Political connections and allocative distortions. J. Financ. 74, 543–586.
Schulze, W.S., Lubatkin, M.H., Dino, R.N., 2003. Toward a theory of agency and altruism in family firms. J. Bus. Ventur. 18 (4), 473–490.
Servaes, H., Tamayo, A., 2017. The role of social capital in corporations: a review. Oxf. Rev. Econ. Policy 33, 201–220.
Shailer, G., Wang, K., 2015. Government ownership and the cost of debt for Chinese listed corporations. Emerg. Mark. Rev. 22, 1–17.
Shen, Y.F., Liu, W.F., You, J.X., 2009. Embeddedness: corporate social capital and corporate financing structure: evidence from Chinese listed companies of real estate. Econom. Manag. J. 5, 109–116.
Shue, K., 2013. Executive networks and firm policies: evidence from the random assignment of MBA peers. Rev. Financ. Stud. 26, 1401–1442.
Sobel, M.E., 1982. Asymptotic confidence intervals for indirect effects in structural equation models. Sociol. Methodol. 13, 290–312.
Song, F., Cadsby, C.B., Bi, Y., 2012. Trust, reciprocity, and guanxi in China: an experimental investigation. Manag. Organ. Rev. 8 (2), 397–421.
Stanley, W., Katherine, F., 1994. Social Network Analysis: Methods and Applications. Cambridge University, Cambridge.
Su, D., Zhao, S., Liu, W., 2019. Short-selling and stock price crash risk: evidence from the GEM Board of the Shenzhen Stock Exchange. Int. Rev. Econ. Financ. 62, 332–349.
Tang, X., Lin, Y., Peng, Q., Du, J., Chan, K.C., 2016. Politically connected directors and firm value: evidence from forced resignations in China. North Am. J. Econom. Finance 37, 148–167.
Tang, S., Wang, J., Ma, Y., Sun, Z., 2017. Collaterals, social networks and trade credits. Nankai Business Rev. 20, 53–64 (In Chinese).
Uzzi, B., 1997. Social structure and competition in inter firm networks: the paradox of embeddedness. Adm. Sci. Q. 42, 35–67.
Van Binsbergen, J.H., Graham, J.R., Yang, J., 2010. The cost of debt. J. Financ. 65, 2089–2136.
Villalonga, B., Amit, R., 2006. How do family ownership, control and management affect firm value? J. Financ. Econ. 80 (2), 385–417.
Westphal, J.D., Boivie, S., Ming Chng, D.H., 2006. The strategic impetus for social network ties: reconstituting broken CEO friendship ties. Strateg. Manag. J. 27 (5), 425–445.
Woolcock, M., 1998. Social capital and economic development: toward a theoretical synthesis and policy framework. Theory Soc. 27, 151–208. https://doi.org/10.1023/A:1006884930135.
Wu, W., Peng, F., Shan, Y.G., Zhang, L., 2020. Litigation risk and firm performance: the effect of internal and external corporate governance. Corp. Gov. 28, 210–239. https://doi.org/10.1111/corg.12319.
Xu, Y.K., Li, W., 2016. Does social capital matter for private enterprises' debt sources? Econom. Manag. J. 4, 46–59 (In Chinese).
Ye, K.T., Zhang, R., Xu, H.P., 2010. Reputation, institutional environment and debt financing: evidence from private-owned listed firms in China. J. Financ. Res. 8, 171–183 (In Chinese).
Yu, F., 2008. Analyst coverage and earnings management. J. Financ. Econ. 88, 245–271.
Yu, M., 2010. Analyst following and corporate governance: emerging-market evidence. Account. Res. J. 23, 69–93.
Yu, M.G., Pan, H.B., 2008. The relationship between politics, institutional environment and private enterprises' access to bank loans. Manage. World 8, 9–21 (In Chinese).
Zaman, M., Hudaib, M., Haniffa, R., 2011. Corporate governance quality, audit fees and non-audit services fees. J. Bus. Financ. Acc. 38, 165–197.
Zhang, J., 2008. The contracting benefits of accounting conservatism to lenders and borrowers. J. Account. Econ. 45, 27–54.
Zhang, W., Ke, R., 2003. Trust in China: a cross-regional analysis. Econ. Res. J. 10, 59–70 (In Chinese).
Zhang, D.L., Li, S.H., 2012. Social trust, political relationship and the private enterprises' bank loans. Account. Res. 8, 17–24 (In Chinese).
Zhang, L., Peng, F., Shan, Y.G., Chen, Y., 2023. CEO social capital and litigation risk. Financ. Res. Lett. 51, 103405 https://doi.org/10.1016/j.frl.2022.103405.
Zhao, T., Chan, K.C., 2023. Corporate social network and corporate social responsibility: a perspective of interlocking directorates. Int. Rev. Financ. Anal. 88, 102711.
Zhou, W., 2009. Bank financing in China's private sector: the payoffs of political capital. World Dev. 37, 787–799.
Zou, H., Adams, M.B., 2008. Debt capacity, cost of debt, and corporate insurance. J. Financ. Quant. Anal. 43, 433–466.