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Corporate governance quality and financial leverage: Evidence from China

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ABSTRACT

This study explores the ways of how corporate governance quality affects firms' financial leverage using a panel sample of non-financial listed firms in China during 2000–2018. Empirical results indicate that improved corporate governance quality has a robust and negative effect on financial leverage for the full sample and subsample by ownership, industry, scale, etc. This negative effect is mediated by corporate internal and equity financing. Furthermore, in terms of the corporate performance, we show that financial leverage significantly reduces financial performance, especially during the economic downturn, and it could be offset by the improved corporate governance quality.

1. Introduction

Anecdotal evidence suggests that a financial crisis can be attributed, among other factors, to failures and weaknesses in corporate governance arrangements (Aebi, Sabato, & Schmid, 2012). Correct decisions about the perfect capital structure through corporate governance have an important and practical significance for corporate growth. Studies related to corporate governance quality and financial leverage mainly focus on evaluating the impact of some specific determinants of management on leverage, including board size (Berger, Ofek, & Yermack, 1997; Harford et al., 2008), CEO characteristics (Malmendier, Tate, & Yan, 2011), and audit committee (Chen, Chen, & Wei, 2009). Corporate governance is a system by which corporations are directed and controlled. A single factor, such as ownership structure, board characteristics, and so forth, cannot fully illustrate the overall quality of corporate governance (Bhagat & Bolton, 2008). These different single-factor measurements make it difficult to achieve a consensus on the impacts of corporate governance quality.

After four decades of economic reforms in China, a large number of medium-sized and large firms are now listed on the domestic and overseas stock markets. A closer look at the financial position of these firms shows that the majority of listed firms have excessive debts that undermine their current and future financial position. The over-indebtedness is mostly caused by wrong decisions made by incumbent management (French & McKillop, 2016). Most related research use samples of developed countries to analyze the relationship between corporate governance and leverage. As one of the new emerging countries with plenty of corporations, China has not been paid much attention on these important areas of corporate governance (Liu, Uchida, & Yang, 2012). The evolution of corporate governance in Chinese firms is rather unique and thus requires scrutiny (Jiang & Kim, 2015). Moreover, related empirical research has not yet concluded whether corporate governance quality has a positive, negative, or no impact on financial leverage (Jiraporn & Gleason, 2007; Chen & Matousek, 2020). In this study, we try to shed light on the impacts of corporate governance quality on financial leverage based on a panel data of Chinese non-financial listed firms during 2000–2018.

Therefore, we estimate a compositive corporate governance indicator (CGI) and explore whether and how the corporate governance quality of Chinese listed companies contributes to their current financial problems under the era of a New Normal.[1] We observe that the improved corporate governance quality has a significant and negative impact on financial leverage, and this effect is robust in the full sample and the subsamples by corporate ownership, industry, and scale, among other aspects. This negative association between corporate governance and leverage is mediated by corporate internal financing and equity

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[1] The era of New Normal literally means to return to normal after a period of abnormal state. This concept was first put forward by President Xi Jinping when he visited Henan province in May 2014. It means the change of China's economic growth, structural upgrading, and power transformation and points out that under the New Normal, China's economic growth tends to be more stable, the growth power is more diversified, and the development prospect is more stable, which is in sharp contrast with the old normal (The old normal refers to the high growth rate, hot economy, and unsustainable economic growth over a period of time at the cost of environmental pollution). Detailed information can be found in Xinhuanet (http://www.xinhuanet.com/politics/2014-11/09/c_1113175964.htm in Chinese).

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financing.

Both corporate leverage and corporate governance are important factors for corporate value and growth (Nikoskelainen & Wright, 2007; Jandik & Makhija, 2005; Ryu & Yoo, 2011). Many studies have provided empirical evidence on the impacts of financial leverage on corporate performance (Graham, Leary, & Roberts, 2015; Fosu, Danso, Ahmad, & Coffie, 2016; Ellul & Pagano, 2019) and evidence related to corporate governance (Bhagat & Bolton, 2008; Doan & Nguyen, 2018). Whether corporate governance can be a mediator between leverage and financial performance has not been tested before. A firm with perfect corporate governance may be less likely to be leveraged and have higher financial performance. To explore this, we further estimate the direct effect of leverage on corporate financial performance and indirect effect through corporate governance.

The study tries to contribute to current research in the following ways. First, we contribute to the large body of literature on corporate governance and corporate capital structure by providing new evidence on the causal impacts of corporate governance quality on financial leverage. Specifically, we estimate a comprehensive corporate governance index based on Schweizer, Walker, and Zhang (2017) to clarify the impacts of corporate governance. Second, we contribute to the literature on corporate governance quality and financial leverage by exploring the mechanism of corporate governance quality and financial leverage from internal financing and equity financing. Third, we not only explore the effect of financial leverage on corporate financial performance directly but also indirectly through improved corporate governance quality. We also estimate the values that corporate governance quality needs to achieve to make firm leverage beneficial for financial performance. This analysis is based on the threshold effects introduced by Kose, Prasad, and Taylor (2009). Moreover, we detect whether the indirect relationship among financial leverage, corporate governance quality, and financial performance changes under different economic conditions.

The remainder of this paper is organized as follows. Section 2 is the literature review. Section 3 introduces the data and research design. Section 4 reports the empirical results and robustness checks. Section 5 presents a further discussion of the empirical results. Section 6 concludes.

2. Literature review

Corporate governance quality has attracted the attention of the whole world because of the emergence of a market crisis (Bai, Liu, Lu, Song, & Zhang, 2004; Nguyen, Ntim, & Malagila, 2020). In essence, corporate governance is a set of mechanisms based on the institution and market to guide a company's self-interest controller to make decisions that maximize the value of the corporate shareholder (Denis & McConnell, 2003). A firm with good corporate governance ensures adequate returns for its investors. The majority of studies on corporate governance outside of China focus on some particular aspect of the corporate governance system (Bhagat & Bolton, 2019), such as board structure (Harford et al., 2008), CEO characteristics (Malmendier et al., 2011), sex heterogeneity of executives (Greene, Intintoli, & Kahle, 2020), supervisory board (Xie, Davidson III, & DaDalt, 2003), and ownership (Harford et al., 2008).

There is extensive literature on corporate governance in China (Bai et al., 2004). Political and economic reforms took place gradually in China starting in the 1970s, and these reforms have brought a unique Chinese-style corporate governance structure in China by introducing concepts and practices from Western countries (Jiang & Kim, 2015). In Chinese company law (the Fourth Revision in 2018), three governance organizations are emphasized in corporate governance: shareholders meeting, board of directors, and board of supervisors.[2] Empirical evidence about corporate governance in China tends to use a set of quantifiable indicators to identify corporate governance practices (Jiang & Kim, 2015). However, corporate governance is a complete system (Bhagat & Bolton, 2008), and specific indicators cannot evaluate the overall quality of corporate governance (Schweizer et al., 2017). Therefore, a comprehensive CGI is more appropriate for measuring management quality. To eliminate these worries, many studies adopt a comprehensive corporate governance index to represent the effect of the single indicators mentioned earlier (Brown, Fazzari, & Petersen, 2009; Schweizer et al., 2017). Previous research related to corporate governance mainly focuses on the association between corporate governance and corporate behaviors such as donations (Harris, Petrovits, & Yetman, 2015), financial fraud (Chen et al., 2009), and corporate innovation (Amore & Bennedsen, 2016). Literature concerning financial performance (Bhagat & Bolton, 2019; Chen & Matousek, 2020) is also available.

Since the proposition of debt irrelevance and dividend irrelevance was introduced in Modigliani and Miller (1958), leverage has been deemed to be closely related to corporate finance because using external debt can reduce the agency costs derived from the conflict between corporate managers (Crutchley & Hansen, 1989). Empirical evidence about the financial leverage of firms has estimated its determinants (Dewenter & Malatesta, 2001; Ellul & Pagano, 2019; Alter & Elekdag, 2020), its influences on corporate performance (Firth, Lin, & Wong, 2008; Graham et al., 2015), and corporate investment (Aivazian, Ge, & Qiu, 2005). As a reflection of the fact that previous financial crises were largely attributed to failures and weaknesses in corporate governance arrangements (Aebi et al., 2012), there is a growing number of studies that analyze the impact of corporate governance and corporate capital structure, especially debt financing (financial leverage).

Most related research focused on the relationship between corporate governance and leverage by using samples of developed countries. As a new emerging country with plenty of corporations, China has not paid much attention to these important areas of corporate governance (Liu et al., 2012). As the banking system plays a more prominent role in China, the evolution of corporate governance of Chinese firms is rather unique and requires scrutiny for the past decades (Jiang & Kim, 2015). Although existing research has not confirmed the effects of corporate governance on financial leverage in emerging countries (Ho, Wu, & Xu, 2011), we find that an indefinite relationship between corporate governance and financial leverage seems to exist in Chinese firms. As Chen et al. (2009) reveal, corporate governance has a negative effect on debt financing.

Nevertheless, empirical research about the effect of corporate governance on firm leverage in China remains insufficient, and no consensus on the effects of corporate governance has been reached. Studies related to corporate governance quality and leverage mainly focus on evaluating the effects of some particular management factor. With regard to the measurement of corporate governance by CEO characteristics, Ho, Huang, Lin, and Yen (2016) show that overconfident executives tend to increase leverage. As for board size, Berger et al. (1997) confirm that board size has a positive effect on the leverage of American public firms, a result that is contrary to the view of Harford et al. (2008) that larger boards hold more debts. An inconsistent conclusion can also be found regarding the relationship between female executives and leverage (Strøm, D'Espallier, & Mersland, 2014). These different specific measurements make it difficult to achieve a consensus. A compositive indicator should be more appropriate for analysis. Furthermore, in the current literature, very few or no study has analyzed how corporate governance affects leverage in China. Thus, the present study estimates a compositive CGI to explore whether corporate

[2] Detailed information about the Company Law is available on the website of the People's Congress of China (http://www.npc.gov.cn/).

governance quality influences financial leverage and examine the mechanism between corporate governance quality and financial leverage from corporate internal financing and equity financing.

Financial leverage and corporate governance of firms are also important factors for corporate value and growth (Jandik & Makhija, 2005; Ryu & Yoo, 2011). Leverage is expected to affect corporate financial performance (Graham et al., 2015; Fosu et al., 2016; Ellul & Pagano, 2019). As discussed above, corporate governance influences corporate performance and leverage. However, whether corporate governance quality can be a mediator between leverage and financial performance has not been tested. Theoretically, firms with weak governance quality may need higher or lower leverage, whereas firms with perfect corporate governance can reduce agency costs and be less likely to be leveraged. To explore this notion, we further estimate the direct effect of leverage on corporate financial performance and indirect effect through corporate governance. We also verify whether these effects exist and change during an economic upside and downside.

On the basis of the above literature review, we show that the focus of our study fits into the large literature about corporate governance (Bai et al., 2004; Harford et al., 2008; Nguyen et al., 2020), capital structure (Crutchley & Hansen, 1989; Ellul & Pagano, 2019; Graham et al., 2015), and financial performance (Ryu & Yoo, 2011; Fosu et al., 2016). While existing research mainly uses a specific factor to measure corporate governance, which cannot fully illustrate the overall quality of corporate governance (Bhagat & Bolton, 2008), there is no consensus on the effects of corporate governance. The present study estimates a comprehensive corporate governance index based on Schweizer et al. (2017) and aims to provide new empirical evidence on the relationship between corporate governance quality and financial leverage. Furthermore, to our best knowledge, very few or no study has analyzed how corporate governance affects leverage in China. The current literature likewise reveals that both financial leverage and corporate governance of firms are important factors for corporate performance (Ellul & Pagano, 2019; Ryu & Yoo, 2011). Whether corporate governance quality can be a mediator between financial leverage and financial performance has not been tested before. Thus, there is a need to explore how corporate governance quality influences leverage and evaluate the impact of leverage on corporate performance directly and during the business cycle indirectly.

3. Variables, data, and methodology

3.1. Variables and data specification

We introduce the used variables in our analysis in the following section. Previous studies on corporate governance mainly use the ratio of total book debts to book assets to measure the financial leverage of firms. For consistency with previous research, we adopt this definition to estimate leverage. To further describe the heterogeneous effect, we split the leverage into short and long leverage according to the term of debt as well as into bank lending leverage and commercial credit leverage according to the source of debt. Table A1 shows detailed information of the variables.

Current studies about the effect of corporate governance focus on the single CGIs arising from gender of executives (Strøm et al., 2014), board size (Watson, 2013), and ownership (Abdallah & Ismail, 2017; Ryu & Yoo, 2011). However, these indicators cannot fully capture the overall quality of corporate governance and may encounter a multicollinearity problem when using some of the individual governance indicators (Brown et al., 2009). To eliminate this shortcoming, many studies adopt a comprehensive corporate governance index to represent the effect of the single indicators mentioned above (Brown et al., 2009; Schweizer et al., 2017). In the current study, we follow Schweizer et al. (2017) and compute our CGI.

To examine the influence of firms' financial leverage on corporate performance, we refer to Aivazian et al. (2005) and Graham and Tucker (2006) and use corporate sales revenue (*Revenue*) as a proxy variable of profitability. Drawing from Chen and Shimerda (1981), we calculate the liquidity index (*Liquid*) as the ratio of current debts to current assets to reflect corporate solvency. We also employ the *Z*-score index (*Zscore*) to reflect corporate operating risk according to Almamy, Aston, and Ngwa (2016).

Table 1
Descriptive statistics.

Variables	(1)	(2)	(3)	(4)	(5)
	N	Mean	S.d.	Min	Max
Leverage	9093	47.75	19.29	0.81	95.69
CGI	9093	3.75	1.23	0.00	7.00
Profit	9093	5.65	5.14	−13.54	23.18
PE	6285	64.63	82.32	−18.95	358.82
Age	9093	51.61	6.61	29.00	78.00
State	9093	0.74	0.44	0.00	1.00
FAR	9093	28.08	18.99	0.26	73.99
Lncapi	9093	22.02	1.36	18.60	28.41
Cash	9056	0.75	1.40	0.03	11.04
Assets	9093	7.58	10.85	0.52	41.62
Employee	9067	5.27	8.89	0.07	51.25
Revenue	9092	4.83	7.34	0.17	27.30
Short-Leverage	9093	128.16	120.74	0.82	2219.99
Long-leverage	9093	38.22	17.54	0.80	92.06
Bank-leverage	9063	9.56	11.40	−9.33	71.90
Credit-leverage	8330	22.04	15.97	0.00	80.92
Leverage2	8387	17.34	13.29	0.00	86.45
CGI1	9093	3.03	1.28	0.00	7.00
Law	7196	6.86	3.69	−0.70	16.61
Equity	9093	52.95	24.80	4.31	786.89
Internal	9042	14.39	12.92	−28.85	55.65
Liquid	9093	179.62	150.76	52.25	800.37
Z-score	8976	3.65	4.24	0.32	36.34
Inventory	9028	13.13	38.31	0.14	327.84

We include the control variables that affect the financial leverage and performance of firms in the following analysis. According to the model specification in Chen et al. (2009), we control corporate size (*Lncapi*), P/E ratio (*PE*), profitability (*Profit*), fixed assets ratio (*FAR*), cash ratio (*Cash*), corporate age (*Age*), and ownership (*State*) in analyzing the effect of corporate governance on leverage with the following considerations. *Lncapi* and *FAR* are indicators denoting corporate scale, wherein a larger firm may need higher debts to cater production, and *PE* and *Profit* represent corporate financial performance. We believe a profitable company can be self-sufficient and is less likely to rely on external debt. The same holds true for cash ratio (*Cash*). As for corporate age, a mature firm is capable of dealing with its financing needs. In previous literature such as Kieschnick and Moussawi (2018), corporate leverage was confirmed to be related negatively to corporate age. The effect of corporate governance on corporate capital structure may also relate to the firm's age. We therefore add these factors into our model specification. Moreover, we include inventory turnover (*Inventory*) in studying the performance effect of corporate governance quality and financial leverage.

We collect a panel data of listed firms during the period of 2000–2018 in China from CSMAR (www.gtarsc.com) and Wind database (www.wind.com.cn). CSMAR and Wind database are large-scale, comprehensive commercial databases for economic and financial research, especially for Chinese listed firms. We remove firms from the financial industry, the ST/*ST[3] listed firms, firms with a net asset per share less than 1, and firms with substantial missing data. We also perform data tail reduction by 1% and 99% for continuous variables to minimize the disturbance of outliers (Schweizer et al., 2017). Table 1 reports the descriptive statistics.

[3] ST indicates "special treatment," meaning the target company is a listed company with abnormal financial or other conditions. Specifically, an ST company is at loss for two consecutive years, while an *ST company has been in deficit for three years and its shares may be at risk of being delisted.

3.2. Research design

Our exploration of how corporate governance influences financial leverage is underpinned by the studies of Bai et al. (2004) and Schweizer et al. (2017). The two-way fixed effect in year and industry is used for the following analysis. The specification of the empirical model is design as follows:

$$Leverage_{it} = \beta_0 + \beta_1 CGI_{it} + \beta_2 Controls_{it} + \gamma_t + \propto_k + \varepsilon_{it} \quad (1)$$

where *i* denotes firm; *t* denotes year; *k* denotes industry; *leverage*, *CGI,* and other variables are defined as above.β_1 represents the effect of corporate governance on leverage, and the heteroscedasticity robust standard error is used in the following analysis. To further control the heterogeneity of different firms, we divide the sample into different groups according to the different aspects of the firms' characteristics, including the ownership and boards, industry, scale, and type of financial leverage. It is also used to do our robustness check.

3.2.1. Robustness check

We conduct the robustness checks for the baseline regression. First, following Bowman (1980), we use the debt-to-equity ratio as an alternative indicator of leverage. Second, to rule out the concern about the measurement of corporate governance quality, we re-estimate CGI. As Bhagat and Bolton (2008) show, the median value of sub-indicators should be used instead of means. We therefore redefine the value of components in corporate governance (i.e., board meeting equals 1 if the annual board meeting of the firm is less than the median value of all firms in year t, and 0 otherwise). New corporate governance quality is defined as CGI1. Third, to address the potential influence of other confounders, we put forward several measures, including further controlling equity pledging, comparing to the baseline model, removing the samples with mergers and acquisitions (M&As), and omitting the firms issuing the B/H shares.[4]

As regional difference may affect the external finance of firms, we further control the legal environment index added into the basic regression. Next, we introduce the province fixed effect and two-way joint fixed effects among year, province, and industry. Lastly, a previous analysis is based on the hypothesis that the independent variables are exogeneous while an endogenous problem like the potential endogeneity from board-specific characteristics is unobservable and could be a challenge for corporate governance research (Hermalin & Weisbach, 2003).

3.2.2. Further analysis

We conduct mechanism analysis based on the baseline models. First, most listed companies at present rely on debt financing. Myers (1984) state that under information asymmetry, the optimal order of corporate financing is internal financing, debt financing, and then equity financing. However, when external financing is limited, internal financing becomes a good way of financing (Guariglia, Liu, & Song, 2011). In fact, internal financing will not increase the financial leverage of firms because it converts corporate savings (mainly including retained earnings and depreciation) into capital and investment. Many studies have proved the importance of internal financing to firms. Seifert and Gonenc (2018) study the influence of corporate governance on the cash management of firms and find that firms with strong corporate governance have less cash holdings but high cash values. Therefore, internal financing could be an important substitute for debt. We use the ratio of the sum of retained earnings and depreciation to assets as corporate internal financing (*Internal*) and explore whether the relationship between corporate governance quality and financial leverage is mediated by internal financing. In addition to internal financing, firms are more inclined to use equity financing for long-term development. In equity financing, new investors are invited, and all absorbed funds become corporate capital, thus ensuring the continuity of innovation investment in the future. Compared to the necessary pledge (like tangible assets) and high repayment pressure in debt financing, equity financing can also be a replacement for debt financing. Thus, we also examine whether the effect of corporate governance on leverage is mediated by equity financing. To verify this hypothesis, we perform a three-step regression based on Preacher and Kelley (2011):

$$Leverage_{it} = \beta_0 + \beta_1 CGI_{it} + \beta Controls_{it} + \gamma_t + \propto_k + \varepsilon_{it} \quad (2)$$

$$Mediator_{it} = \beta_0 + \beta_2 CGI_{it} + \beta Controls_{it} + \gamma_t + \propto_k + \varepsilon_{it} \quad (3)$$

$$Leverage_{it} = \beta_0 + \beta_3 CGI_{it} + \beta_4 Mediator_{it} + \beta Controls_{it} + \gamma_t + \propto_k + \varepsilon_{it} \quad (4)$$

To estimate the significant magnitude of corporate governance quality and financial leverage on financial performance, we estimate firms' annual sales revenue (*Revenue*) following Graham and Tucker (2006), liquidity (*Liquid*) according to John (1993), and *Z*-score based on Almamy et al. (2016). We use these variables to measure corporate financial performance and perform the following regression:

$$Y_{it} = \beta_0 + \beta_1 CGI_{it} * leverage_{it} + \beta_2 leverage_{it} + \beta_3 CGI_{it} + \beta_4 Controls_{it} + \gamma_t + \propto_k + \varepsilon_{it} \quad (5)$$

Y_{it} represents all the performance indicators, and other variables are defined as before. Our main variables of interests are leverage and the interaction term between corporate governance quality and financial leverage (*CGI * Leverage*).

To check whether this relationship changes with the situation of a booming index, we further divide the samples into different groups according to the tightness of the central bank's monetary policy.

4. Results

4.1. Baseline results

We explore the causal relationship between corporate governance and leverage based on Eq. 1, and the results are reported in Table 2. We observe that corporate governance has a significant negative effect on financial leverage, as shown as column (1). This association remains significant when we add other possible interferences in columns (2)–(5). Specifically, the improvement of corporate governance quality is expected to reduce financial leverage by 0.55 with a full specification of control variables. This roughly takes up 1.2% of the full sample. Our findings are consistent with those of Doan and Nguyen (2018) that improved corporate governance in terms of active boards reduces leverage during post-crisis.

In terms of the control variables, we find a positive effect of corporate size on firm leverage. One possible explanation may be that the larger companies tend to be equipped with poor management performance, as illustrated in Crutchley and Hansen (1989), and thus the leverage would be high. The increase of *FAR* leads to higher leverage. Generally, firms with high tangibility need high leverage for production. A mature firm tends to be less likely to rely on debt financing and have lower leverage (Kieschnick & Moussawi, 2018). Compared to non-state-owned enterprises (SOEs), SOE firms are characterized by higher leverage as well. Firms with larger state ownership have fewer capital restrictions, and thus more debt financing will be available while profit and cash will have negative effects on leverage, an outcome similar to those in other studies (Harford et al., 2008). With sufficient profit and considerable cash holdings, the needs for corporate debt financing or financial leverage will decline.

[4] For public firms in China, the A share is issued to the domestic investors while the B share is issued to foreign investors. The H share is issued at the Hong Kong stock market. Some of these public firms may issue two or three kinds of shares.

Table 2
Corporate governance quality and financial leverage.

Variables	(1)	(2)	(3)	(4)	(5)
	Leverage	Leverage	Leverage	Leverage	Leverage
CGI	−1.0950***	−1.0255***	−0.8456***	−0.5206***	−0.5535***
	(0.1512)	(0.1777)	(0.1717)	(0.1518)	(0.1525)
Lncapi	6.7870***	6.8282***	6.8341***	5.2689***	5.2196***
	(0.1620)	(0.1856)	(0.1799)	(0.1629)	(0.1646)
FAR	0.0949***	0.1465***	0.1181***	0.0007	−0.0007
	(0.0133)	(0.0172)	(0.0167)	(0.0150)	(0.0150)
Age	−0.2493***	−0.2536***	−0.2037***	−0.1411***	−0.1414***
	(0.0277)	(0.0343)	(0.0335)	(0.0299)	(0.0298)
PE		0.0028	−0.0028	−0.0036***	−0.0037**
		(0.0018)	(0.0018)	(0.0016)	(0.0016)
Profit			−0.9195***	−0.7348***	−0.7324***
			(0.0452)	(0.0400)	(0.0400)
Cash				−5.4311***	−5.4098***
				(0.1723)	(0.1729)
State					0.9580**
					(0.4427)
Constant	−80.1684***	−80.9580***	−76.5210***	−43.5742***	−43.2184***
	(4.0667)	(4.4839)	(4.3832)	(3.9502)	(3.9464)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	9093	6285	6285	6284	6284
R^2	0.3265	0.3866	0.4320	0.5643	0.5646

Notes: Robust standard errors are presented in parentheses.
*** Represent the significance level at 1%.
** Represent the significance level at 5%.
* Represent the significance level at 10%.

4.2. Heterogeneous analysis

We next aim to explore whether the effects of corporate governance on leverage are heterogeneous. Specifically, we perform the following analysis to investigate the difference in firms' ownership, listing boards, industry type, and corporate size.

To explore the heterogeneity on ownership and listing markets, we first divide firms into SOEs and non-SOEs according to their ownership. Firms with state ownership are owned by the central or local government (Dewenter & Malatesta, 2001), and all other firms are classified into the non-state-owned group. In terms of the listing boards, the Chinese stock exchange market has three types: motherboard, small- and medium-sized board (SME), and growth enterprise market (GEM). We split the firms into motherboard, SME, and GEM groups to estimate their heterogeneity. Previous research, like Kedia and Panchapagesan (2011), conduct a similar specification empirical analysis.

We run regressions for these subsamples by corporate ownership and listing boards based on our basic Eq. 1 in Section 3.2. The empirical results are reported in Table 3. As indicated in columns (1)–(2) of Table 3, we observe that corporate governance has a negative and significant effect on the financial leverage of firms with state ownership (about 0.61) but does not have any significant effect on leverage at non-state-owned firms. Previous studies like Borisova, Brockman, Salas, and Zagorchev (2012) note that firms with state ownership are accompanied by lower corporate governance quality. In addition, these firms have smaller restrictions on capital financing (Firth et al., 2008). Generally, SOEs rely more on borrowing and are expected to be more leveraged than private firms (Dewenter & Malatesta, 2001). Thus, the improvement of corporate governance quality has an evident effect on the financial leverage of SOEs. In terms of heterogeneity on firms' listing boards, we find that corporate governance significantly reduces the leverage of motherboard listing firms by about 0.68 rather than at the SME and GEM firms. This may relate to the asset-intensive and low-return characteristics of motherboard firms, whereas firms listed on SME and GEM have smaller capital restrictions and are more efficient (Jiang, Jiang, & Kim, 2017). Thus, the increase of CGI is expected to have a larger impact on motherboard firms.

We next want to investigate the heterogeneity on some industry attributes.[5] We first divide firms into two samples according to their pollution intensity: high-polluted and low-polluted industry according to the *Guidelines for Environmental Information Disclosure of Listed Companies* issued by the Chinese Ministry of Environmental Protection. The high-polluted group includes 16 industries.[6] Second, we split firms into high-tech and non-tech,[7] with the former expected to be less likely to rely on debt financing for its productive efficiency and innovativeness. We also split firms into "heavy" asset and "light" asset groups based on their *FAR*; a firm is "heavy" if its *FAR* is no less than the mean value of the sample in the fiscal year.

Table 4 reports the regression results for these subsamples using Eq. 1. First, the negative effect of corporate governance on leverage is significant in high-polluted firms by about 0.73. The enterprise quality report of Chinese listed firms in 2018 reveals that the asset–liability ratio of firms in high-polluted industries, such as steel, building materials, coal, and chemical industry, increased dramatically.[8] Therefore, the improvement of corporate governance could have a positive effect on the corporate capital structure. Second, we observe that the increase of CGI significantly reduces more leverage of non-technical firms. Generally, debt financing is less attractive for high-tech firms because they

[5] On the basis of corporate industry attributes, we also divide firms into three groups, namely, primary, secondary, and tertiary industry. The heterogeneous effects of CGI on other types of leverages are further estimated in this study, and all regressions results are reported in the Supplementary Materials (Table A2). Clearly, CGI has a negative effect on firm leverage in the secondary industry, and the increase of CGI reduces corporate longer-term leverage and bank leverage.

[6] The high-polluted industries are thermal power, steel, cement, electrolytic aluminum, coal, metallurgy, chemical, petrochemical, building materials, papermaking, brewing, pharmaceutical, fermentation, textile, and leather and mining industry.

[7] The former tech group includes firms from electronics, pharmaceutical and biological products, information technology, chemical fiber manufacturing, chemical raw materials, chemical products manufacturing, instrumentation, and culture industries.

[8] Data source: Wind (https://www.wind.com.cn/)

Table 3
Heterogeneous effects of CGI on leverage across ownership and boards.

	(1)	(2)	(3)	(4)	(5)
Subsample	State	Non-state	Motherboard	SME	GEM
Variables	Leverage	Leverage	Leverage	Leverage	Leverage
CGI	−0.6062***	−0.0812	−0.6806***	0.4710	0.3307
	(0.1721)	(0.3123)	(0.1691)	(0.3339)	(0.6520)
PE	−0.0042**	−0.0024	−0.0034*	−0.0036	0.0008
	(0.0018)	(0.0035)	(0.0018)	(0.0038)	(0.0063)
Profit	−0.7116***	−0.6677***	−0.7189***	−0.7248***	−0.3983**
	(0.0464)	(0.0760)	(0.0448)	(0.0955)	(0.1624)
Lncapi	4.6632***	7.4189***	4.7762***	8.7374***	6.4139***
	(0.1819)	(0.4294)	(0.1865)	(0.5153)	(1.0249)
FAR	−0.0232	0.0267	−0.0183	−0.0034	0.0604
	(0.0166)	(0.0327)	(0.0167)	(0.0331)	(0.1159)
Cash	−6.5549***	−3.8935***	−7.5969***	−3.9750***	−2.5013***
	(0.3175)	(0.1823)	(0.4521)	(0.2353)	(0.2133)
Age	−0.1666***	−0.0536	−0.1751***	0.0229	0.0372
	(0.0386)	(0.0510)	(0.0350)	(0.0641)	(0.1064)
		(3.0113)		(4.4565)	
State			−0.4969	2.1840***	2.3755
			(0.5653)	(0.8246)	(1.5793)
Constant	−28.1680***	−99.4469***	−31.5061***	−119.5226***	−97.7144***
	(4.4612)	(9.4322)	(4.5243)	(12.0103)	(23.0183)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	4769	1515	4822	1005	351
R^2	0.5582	0.6136	0.5241	0.6997	0.6353

Notes: Robust standard errors are presented in parentheses.
*** Represent the significance level at 1%.
** Represent the significance level at 5%.
* Represent the significance level at 10%.

Table 4
Heterogeneous effects of CGI on leverage across industries.

	(1)	(2)	(3)	(4)	(5)	(6)
Subsample	High-polluted	Low-polluted	High-tech	Non-tech	Heavy assets	Light assets
Variables	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage
CGI	−0.7303***	−0.1470	0.2416	−0.6841***	−1.0235***	−0.2613
	(0.1772)	(0.2963)	(0.3275)	(0.1718)	(0.2198)	(0.2020)
PE	−0.0037**	−0.0032	−0.0017	−0.0043**	−0.0034*	−0.0024
	(0.0018)	(0.0034)	(0.0037)	(0.0018)	(0.0019)	(0.0023)
Profit	−0.7496***	−0.6833***	−0.7391***	−0.7221***	−0.6509***	−0.7085***
	(0.0455)	(0.0825)	(0.0765)	(0.0465)	(0.0566)	(0.0564)
Lncapi	4.9938***	5.9365***	6.5530***	4.9156***	4.2897***	5.6030***
	(0.1879)	(0.3441)	(0.3545)	(0.1852)	(0.2483)	(0.2115)
FAR	−0.0001	0.0093	−0.0979***	0.0179	0.0737***	−0.2734***
	(0.0179)	(0.0273)	(0.0306)	(0.0170)	(0.0239)	(0.0448)
Cash	−5.3221***	−5.5025***	−4.6065***	−5.8855***	−8.9798***	−4.8763***
	(0.2009)	(0.3335)	(0.2326)	(0.2435)	(0.6273)	(0.1636)
Age	−0.1797***	−0.0522	−0.1800***	−0.1147***	−0.2343***	−0.0551
	(0.0340)	(0.0599)	(0.0547)	(0.0358)	(0.0436)	(0.0398)
State	0.9905*	0.7775	−0.6075	1.5724***	−0.8702	2.2815***
	(0.5145)	(0.8948)	(0.7844)	(0.5352)	(0.6772)	(0.5686)
Constant	−38.3539***	−65.1488***	−73.4668***	−38.6088***	−16.9131***	−53.5539***
	(4.1041)	(7.7885)	(8.4320)	(4.2699)	(5.7091)	(4.9242)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4253	2031	1338	4946	2938	3346
R^2	0.5707	0.5576	0.5409	0.5515	0.5272	0.6525

Notes: Robust standard errors are presented in parentheses.
*** Represent the significance level at 1%.
** Represent the significance level at 5%.
* Represent the significance level at 10%.

have more patents and intangible assets, whereas leverage financing serves an important role for non-tech firms (Faroque, Morrish, & Ferdous, 2017). It makes sense that the leverage of non-tech sectors will be reduced sharply in response to the improvement of corporate governance. Lastly, compared to "light" asset firms, CGI significantly reduces firms' financial leverage of heavy assets. Firms with heavy assets intensity have larger *FAR* and rely more on debt financing. Firms with light assets can reduce operational risk like leverage for their lower fixed assets (Mandelker & Rhee, 1984).

Finally, we explore whether the effects of corporate governance on

leverage vary across corporate size/scale. We perform the quantile regressions for our baseline specifications according to the corporate assets, employee, and annual revenue for robustness considerations, and the results are reported in Table 5. We observe that our previous findings about the negative association between corporate governance and financial leverage are significant in large-scale firms in terms of different departing indicators. One possible explanation could be that larger firms are expected to have less constraints on credit and financing (Chan, Dang, & Yan, 2012), and corporate size should pose a positive effect on leverage as our baseline (see Table 2). Thus, the improvement of corporate governance can have evident deleveraging effects in larger size firms.

Overall, we find that the association between corporate governance and financial leverage is heterogeneous in terms of corporate ownership, size, and industrial characteristics, among other aspects. Improved corporate governance is expected to have more evident negative impacts on the leverage of state-owned, motherboard, high-polluted industries, secondary industries, non-high-tech industries, heavy asset industries, and large-scale firms.[9] This outcome highlights the importance of heterogeneity in policy making and implementation. Especially for large enterprises with overcapacity or SOEs, determining how to improve corporate governance is crucial to their sustainable development.

4.3. Robustness checks

In this section, we conduct various robustness checks to exclude the consideration about variable designation, such as financial leverage, corporate governance quality, and the interference of other confounders: equity pledging, M&As, financial legal environment, the endogeneity of CGI, and so on.

4.3.1. Alternative leverage indicator

Our first checks focus on an alternative indicator for leverage to prove the robust relationship between corporate governance quality and financial leverage. In a previous section, we use the debt-to-asset ratio as leverage; here we follow the measurement in Bowman (1980) to estimate the debt-to-equity ratio as the firms' financial leverage and replace the independent variable in Eq. 1. The empirical result is reported in column (1) of Table 6, where the negative effect of corporate governance quality on financial leverage is shown to remain significant.

4.3.2. Alternative corporate governance

To further exclude the concerns on CGI, we re-perform our basic regression (Eq. 1) with CGI1. As shown in column (2) of Table 6, the increase of corporate governance reduces the financial leverage of firms by 0.49, which is similar to our baseline estimate in Table 2.

4.3.3. Other potential influencers

First, equity pledging may influence firms' financial leverage. Angbazo, Mei, and Saunders (1998) confirm that firms could receive finance by pledging specific collateral in the form of assets or the equity of borrowers. Equity finance shows its advantages over debt financing. Corporate executives prefer to pledge equity for the consideration that additional equity will not create adverse selection problems (Brown et al., 2009) and weaken the firms' financial situation. Thus, we add corporate pledge in our baseline regression and report the results in column (3) of Table 6. Our previous findings about the negative association between corporate governance and leverage are shown to remain significant at 1%.

[9] In addition to these heterogeneities, we also explore whether corporate governance has a heterogeneous effect on different types of leverages. We split samples according to the maturity and financing sources of debt and observe the heterogeneous effects of corporate governance on leverage in different subsamples. The results are presented as Supplementary Material to save space.

Second, M&As are an important management strategy in corporate governance and are characterized by leverage and hostility (Holmstrom & Kaplan, 2001). The listed firms are keen to pursue large-scale investment and actively participate in M&As for growth or higher profit needs. Therefore, we re-perform our basic regression using samples without M&As. As revealed in column (4), the negative effect of corporate governance on leverage remains significant.

Third, most Chinese listed firms issue A shares while other firms issue B/H shares in addition to A. This means that these firms will be subject to different market constraints from their main market (Bai et al., 2004). We perform a similar regression excluding firms that issue B/H shares simultaneously, and report the results in column (5) of Table 6. We find that the effect of CGI on financial leverage remains negative and significant.

La Porta, Lopezdesilanes, Shleifer, and Vishny (1997) emphasize that the legal environment influences corporate external finance, and the legal system should influence firms' financial leverage (Pour & Lasfer, 2019). To rule out the interference of an external legal environment, following the specification in Chen et al. (2009), we add a legal environment index (*Law*) in our basic regression (Eq. 1 in Section 3.2). The results are reported in column (1) of Table 7. It is implied that corporate governance still negatively affects leverage after ruling out the potential influence from the external environment.

There are other factors influencing leverage apart from these factors in our baseline regression, but we have no exhaustive way of controlling for possible interferences, which include regional financing policies, local protection, and support for specific firms. Although the year and industry fixed effects are included to control for unobserved time-variant or industry-variant influences, we do not focus on regional differences on financing. Such factors could also be time-variant at the same province and industry. To rule out such possibilities, we add other fixed effects in our baseline model: province fixed effects and two-way joint fixed effects among year, province, and industry. The results are reported in columns (2)–(5) of Table 7. Our previous findings are robust with stronger control potential interference, and we find a greater impact of corporate governance on leverage.

Our previous findings may also encounter the endogeneity concern. To exclude the endogeneity of corporate governance quality, following the measure in De Andres and Vallelado (2008) and Wintoki, Linck, and Netter (2012), we use the lag of corporate governance as the instrument variable for CGI and conduct a two-step estimator (2sls) for our baseline regression in column (6) of Table 7. The identification and weak instrumental tests are guaranteed for our instrument validity. Our results confirm the negative relation between corporate governance quality and financial leverage.

5. Discussion

5.1. Corporate governance quality and source of finance

In the previous section, we confirm the negative relationship between corporate governance quality and financial leverage as well as its heterogeneous effect across corporate ownership, industry, and scale, and other heterogeneous aspects. To further explore how corporate governance quality influences financial leverage, in Section 3.2, we perform the mechanism analysis from corporate internal financing and external equity financing by employing a three-step regression model based on Preacher and Kelley (2011).

Table 8 reports the results of three regression analyses. As shown in columns (1)–(3), all coefficients are significant at 1%, which implies that the partial mediating effect of internal financing on the relation between corporate governance quality and financial leverage exists (Preacher & Kelley, 2011). Furthermore, the mediating effect of internal financing is

Table 5
Heterogeneous effects of CGI on leverage across scale.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Assets		Employee		Revenue	
	0–50%	50% ~ 100%	0–50%	50% ~ 100%	0–50%	50% ~ 100%
CGI	0.2380	−0.8260***	0.0909	−0.7133***	0.1651	−0.7644***
	(0.3012)	(0.1682)	(0.2839)	(0.1702)	(0.2823)	(0.1698)
PE	−0.0029	−0.0028	−0.0046**	−0.0014	−0.0014	−0.0043*
	(0.0023)	(0.0020)	(0.0023)	(0.0019)	(0.0022)	(0.0023)
Profit	−0.4920***	−0.8963***	−0.4457***	−0.8549***	−0.4584***	−0.8808***
	(0.0624)	(0.0523)	(0.0651)	(0.0536)	(0.0641)	(0.0529)
Lncapi	6.8720***	4.2131***	7.2466***	4.1669***	5.1603***	4.0220***
	(0.6688)	(0.2131)	(0.4023)	(0.2144)	(0.5290)	(0.2091)
FAR	−0.0139	−0.0014	0.0203	−0.0385**	0.0823***	−0.0663***
	(0.0276)	(0.0175)	(0.0234)	(0.0196)	(0.0264)	(0.0176)
Cash	−4.6109***	−7.0234***	−4.6063***	−9.2434***	−4.1850***	−8.9702***
	(0.1774)	(0.4321)	(0.1638)	(0.8311)	(0.1549)	(0.7509)
Age	−0.1208**	−0.1471***	−0.0971**	−0.1677***	−0.0708	−0.2304***
	(0.0473)	(0.0380)	(0.0454)	(0.0390)	(0.0462)	(0.0369)
State	1.0967	0.8796	1.1888*	0.5780	0.9516	0.4638
	(0.6828)	(0.5834)	(0.6758)	(0.5799)	(0.6866)	(0.5633)
Constant	−84.3893***	−13.6226**	−96.9512***	−9.8526	−58.4600***	1.7373
	(13.7816)	(5.7054)	(8.8362)	(6.0446)	(11.1515)	(5.2872)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2142	4142	2476	3796	2188	4095
R^2	0.5282	0.5524	0.5906	0.5465	0.5404	0.5487

Notes: Robust standard errors are presented in parentheses.
*** Represent the significance level at 1%.
** Represent the significance level at 5%.
* Represent the significance level at 10%.

Table 6
Robustness analysis.

	(1)	(2)	(3)	(4)	(5)
Variables	Leverage2	Leverage	Leverage	Leverage	Leverage
CGI	−3.3028***		−0.5263***	−0.8277***	−0.3702***
	(1.1603)		(0.1528)	(0.2926)	(0.1613)
CGI1		−0.4852***			
		(0.1453)			
Pledge			1.1846**		
			(0.4667)		
PE	−0.0228**	−0.0037**	−0.0038**	−0.0098***	−0.0040**
	(0.0105)	(0.0016)	(0.0016)	(0.0035)	(0.0016)
Profit	−4.8885***	−0.7355***	−0.7326***	−0.7397***	−0.7610***
	(0.2948)	(0.0399)	(0.0400)	(0.0710)	(0.0411)
Lncapi	31.5922***	5.2269***	5.2249***	5.1794***	5.8600***
	(1.6618)	(0.1658)	(0.1646)	(0.3061)	(0.1844)
FAR	−0.1561	−0.0011	0.0001	0.0182	0.0002
	(0.1056)	(0.0150)	(0.0150)	(0.0256)	(0.0156)
Cash	−15.7310***	−5.4089***	−5.3772***	−4.4408***	−5.2604***
	(0.8474)	(0.1728)	(0.1734)	(0.1902)	(0.1686)
Age	−1.1447***	−0.1364***	−0.1371***	−0.1242**	−0.1355***
	(0.2091)	(0.0296)	(0.0299)	(0.0548)	(0.0312)
State	−1.1315	0.9132**	1.2951***	0.7367	0.9111**
	(2.9778)	(0.4418)	(0.4604)	(0.8139)	(0.4557)
Constant	−416.4306***	−44.2753***	−43.9956***	−48.1837***	−56.9776***
	(33.9087)	(3.9308)	(3.9587)	(6.6077)	(4.3447)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	6284	6284	6284	1860	5690
R^2	0.3704	0.5644	0.5651	0.6146	0.5738

Notes: Robust standard errors are presented in parentheses.
*** Represent the significance level at 1%.
** Represent the significance level at 5%.
* Represent the significance level at 10%.

Table 7
Other robustness analysis.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage
CGI	−0.8136***	−0.5811***	−0.6919***	−0.6641***	−0.7720***	−1.0333***
	(0.1895)	(0.1511)	(0.1558)	(0.1598)	(0.1661)	(0.2862)
PE	−0.0051***	−0.0038**	−0.0035**	−0.0044***	−0.0044**	−0.0030*
	(0.0019)	(0.0016)	(0.0017)	(0.0017)	(0.0017)	(0.0018)
Profit	−0.7170***	−0.7236***	−0.7231***	−0.7358***	−0.7377***	−0.7074***
	(0.0455)	(0.0397)	(0.0402)	(0.0434)	(0.0445)	(0.0444)
Lncapi	5.3650***	5.5041***	5.5476***	5.4931***	5.4915***	5.2128***
	(0.2022)	(0.1624)	(0.1634)	(0.1715)	(0.1747)	(0.1914)
FAR	−0.0220	−0.0147	−0.0126	−0.0285*	−0.0251	−0.0015
	(0.0177)	(0.0149)	(0.0152)	(0.0158)	(0.0162)	(0.0165)
Cash	−5.4192***	−5.2637***	−5.3062***	−5.3082***	−5.3423***	−6.0832***
	(0.1824)	(0.1737)	(0.1742)	(0.1831)	(0.1862)	(0.2471)
Age	−0.1600***	−0.1230***	−0.1245***	−0.1341***	−0.1317***	−0.2129***
	(0.0357)	(0.0298)	(0.0302)	(0.0315)	(0.0320)	(0.0392)
State	−0.3113	1.1425**	1.0173**	0.9168*	0.7928	−0.5370
	(0.5405)	(0.4526)	(0.4625)	(0.4726)	(0.4866)	(0.5840)
Law	−0.3255***					
	(0.0608)					
Constant	−41.5618***	−50.5682***	−53.1353***	−42.0787***	−43.0725***	
	(5.0698)	(4.0419)	(4.3146)	(4.6236)	(5.7281)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE		Yes	Yes	Yes	Yes	
Province#Year FE			Yes		Yes	
Industry#Year FE				Yes	Yes	
K-P rk test						1000.321***
C-D wald test						2180.236***
N	4407	6284	6284	6284	6284	4703
R^2	0.5676	0.5793	0.6016	0.6210	0.6413	0.5462

Notes: (Abdallah & Ismail, 2017) K–P rk and C–D Wald are the abbreviations of Kleibergen–Paap rk LM statistic and Cragg–Donald Wald F statistic, respectively. (Acharya, Drechsler, & Schnabl, 2011) Robust standard errors are presented in parentheses.
*** Represent the significance level at 1%.
** Represent the significance level at 5%.
* Represent the significance level at 10%.

Table 8
Discussion of the empirical analysis.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Leverage	Internal	Leverage	Leverage	Equity	Leverage
CGI	−0.5535***	0.4011***	−0.3891***	−0.5535***	0.5527***	−0.0021
	(0.1525)	(0.1527)	(0.1451)	(0.1525)	(0.1525)	(0.0028)
Internal			−0.3845***			
			(0.0227)			
Equity						−0.9977***
						(0.0023)
PE	−0.0037***	−0.0064***	−0.0058***	−0.0037**	0.0038**	0.0001
	(0.0016)	(0.0017)	(0.0015)	(0.0016)	(0.0016)	(0.0001)
Profit	−0.7324***	1.2184***	−0.2617***	−0.7324***	0.7356***	0.0016
	(0.0400)	(0.0499)	(0.0442)	(0.0400)	(0.0400)	(0.0016)
Lncapi	5.2196***	0.4612***	5.4099***	5.2196***	−5.2452***	−0.0136
	(0.1646)	(0.1674)	(0.1551)	(0.1646)	(0.1640)	(0.0133)
FAR	−0.0007	0.0457***	0.0207	−0.0007	0.0020	0.0013
	(0.0150)	(0.0135)	(0.0137)	(0.0150)	(0.0150)	(0.0013)
Cash	−5.4098***	1.2810***	−4.8959***	−5.4098***	5.4052***	−0.0170
	(0.1729)	(0.1682)	(0.1575)	(0.1729)	(0.1728)	(0.0167)
Age	−0.1414***	0.1565***	−0.0728**	−0.1414***	0.1426***	0.0009
	(0.0298)	(0.0286)	(0.0286)	(0.0298)	(0.0298)	(0.0008)
State	0.9580**	1.1080**	1.3474***	0.9580**	−0.9822**	−0.0219
	(0.4427)	(0.4398)	(0.4213)	(0.4427)	(0.4424)	(0.0218)
Constant	−43.2184***	−27.2918***	−54.3964***	−43.2184***	143.6762***	100.1275***
	(3.9464)	(5.1096)	(4.0984)	(3.9464)	(3.9370)	(0.1329)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	6284	6243	6243	6284	6284	6284
R^2	0.5646	0.2892	0.6251	0.5646	0.5658	0.9968

Notes: Robust standard errors are presented in parentheses.
*** Represent the significance level at 1%.
** Represent the significance level at 5%.
* Represent the significance level at 10%.

0.1644,[10] accounting for 29.7% of the total reduction effect. More specific, corporate governance has a positive effect on internal financing, it implies that the increase of CGI raises internal financing by 0.4%. The increase of internal financing eases the external debt pressure and can realize the deleveraging effect under the improvement of corporate governance. It is consistent with the findings of Almeida and Campello (2007) that firms can achieve investment growth through internal financing, regardless of the constraints due to external debt financing. The improved corporate management is expected to utilize corporate internal financing, effectively.

In addition to internal financing, firms are more inclined to use equity financing than debt financing in terms of their long-term development. Generally, debt financing requires enterprises to provide pledge (like tangible assets) and stable cash flow of principal and interest in the future, which brings high financial pressure to enterprises (Matsa, 2011). Given that equity financing invites new investors and all absorbed funds become corporate capital, it ensures the continuity of innovation investment in the future. Thus, equity financing can also be a replacement for debt financing. We then examine whether the effect of corporate governance on leverage is mediated by equity financing. We treat the owner's equity-to-asset ratio (*Equity*) as the mediator and reconduct the previous three-step regressions as described in Section 3.2.

The results are presented in columns (4)–(6) of Table 8. Based on Preacher and Kelley (2011), we find a full mediating effect of equity financing for corporate governance quality and financial leverage. Corporate governance quality significantly increases equity financing by 0.55. Chen et al. (2009) have a similar finding. They confirm that corporate governance can significantly decrease the cost of equity financing, especially under weak legal protection. Therefore, the improvement of corporate governance could reduce leverage through equity financing.

Taken together, the negative effect of corporate governance quality on firms' financial leverage is significant and can be mediated by internal and equity financing. In other words, corporate governance quality can realize the deleveraging effect with the help of internal and equity financing.

5.2. Corporate governance quality, leverage, and performance

We further examine how financial leverage and corporate governance quality affect the financial performance of firms according to the model specification in Section 3.2. Table 9 presents all empirical results for three alternative measures of corporate financial performance: *Revenue* in columns (1)–(3), *Liquid* in columns (4)–(6), and *Zscore* in columns (7)–(9). Columns (1), (4), and (7) are full sample regressions. Generally, we observe that the financial leverage of firms has an evidently significant and negative impact on corporate financial performance. The increase of financial leverage is expected to reduce corporate revenue by 0.17 and liquidity by 1.17 and raise operating risks by 0.08. This outcome seems inconsistent with Duru, Iyengar, and Zampelli (2012) and Graham et al. (2015), which find that the firms' financial leverage does not have a significant association with corporate performance. In fact, the negative relationship between leverage and financial performance is well documented in the literature (i.e., Fosu et al., 2016).

Moreover, based on the estimates for interaction items between CGI and leverage, we find that the negative impacts of leverage on financial performance can be alleviated to some extent by the improved corporate governance quality. Following previous literature on agency theory, corporate managers tend to magnify individual interests to pursue higher debts (Grossman & Hart, 1983). Excessive debt financing is expected to pose financial distress for firms (Matsa, 2011), and the debt financing creates greater volatility in earnings and bankruptcy costs to corporate finance (Ellul & Pagano, 2019). Improved corporate governance quality can deal with agency problems and make reasonable financing decisions to avoid bankruptcy (Chen et al., 2009). This finding is consistent with those of Bhagat and Bolton (2008) and Doan and Nguyen (2018), who highlight the strategic importance of corporate management and governance. To quantify the importance of corporate governance quality, we estimate threshold values for CGI following the measurement in Kose et al. (2009).[11] Specifically, to what extent should firms' corporate governance quality be achieved to fully offset the negative effect of the firms' financial leverage on performance? We find that corporate governance quality should be at least 2.02 ($0.0857 \times CGI - 0.1735 > 0$) to make leverage beneficial for corporate revenue, 4.93 for corporate liquidity, and 11.94 for corporate operating risks. Compared with the mean sample of CGI (3.75), these expected estimates of corporate governance imply that the current corporate governance quality of firms is unlikely to fully offset the negative impacts due to leverage. It is dangerous for enterprises to blindly pursue higher financial leverage because "improving corporate governance quality" seems to be a protracted battle.

In view of the turbulence of the economic operation, we next aim to explore whether the fluctuation of the external market economy will affect the relationship between corporate governance, leverage, and performance. Previous researchers such as Giroud and Mueller (2017) confirm that firms with higher leverage suffer greater employment losses due to the decline in local consumer demand, and regions with more highly leveraged firms are more negatively impacted. We collect five-year lending interest rates from *The People's Bank of China*[12] to identify the degree of tightness of monetary policy. Usually, the central bank will use a loose monetary policy to reduce interest rates for promoting economic development when the economy is in a downward trend. Fig. B1 reports a gradual increase and sharp downward trend of the interest rate after 2007. Although the rate rises slightly after the global financial crisis in 2008, it shows an overall declining trend. We thus recognize years 2008–2018 as an economic downward period; otherwise, it is an upward period. We reexamine the causal relationship between the three under different status of Chinese economic operation.

Columns (2)–(3), (5)–(6), and (8)–(9) present the results for the split samples by economic trends. Our previous findings remain significant and robust in the economic downward period. Specifically, we find that the association between the above is not stable when the economy goes upward, while we find a direct negative effect of firms' financial leverage on corporate revenue and an indirect effect because of the improved corporate governance quality when economy downward. Similar findings are significant in columns (5)–(6) and (8)–(9) for corporate liquidity and *Z*-score, respectively. The economic upward period is expected to boost social demand. The focus of corporate managers now turns to how to maximize profits in response to economic needs. Financial leverage is likely to help the enterprise gain profits. However, in the process of economic downturn, social overcapacity, and consumption decline, the pressure of financial deleveraging increases. The acceleration effect of leverage will decrease and will even lead to bankruptcy because of heavy debt repayment costs. Determining how to weaken the leverage's reverse effect is critical for the survival of enterprises. Therefore, it is necessary to improve corporate governance quality. We re-estimate the threshold values of CGI and find that corporate governance should be at least 1.57, 2.76, and 8.36 during the economic downside period, respectively.

Overall, our findings remain robust in both the full sample and some split samples. We observe the direct negative impact of leverage on performance, and this impact could be moderated by corporate governance. This result highlights the importance of improving corporate

[10] The mediating effect can be estimated by $\beta_3 - \beta_1$.

[11] The threshold condition is $\beta_1 CGI_{it} * leverage_{it} + \beta_2 leverage_{it} > 0$, which means that $\beta_1 CGI_{it} + \beta_2 > 0$.

[12] Data source: http://www.pbc.gov.cn/

Table 9
Corporate governance quality, financial leverage, and performance.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Revenue			Liquid			Zscore		
	Full	Down	Up	Full	Down	Up	Full	Down	Up
CGI-lev	0.0857***	0.1356***	−0.0073	0.2319*	0.3897***	−0.2649	0.0068***	0.0097***	−0.0011
	(0.0214)	(0.0291)	(0.0138)	(0.1213)	(0.1411)	(0.2288)	(0.0021)	(0.0026)	(0.0035)
Lev	−0.1735***	−0.2134***	−0.0764*	−1.1717***	−1.0760***	−1.4417***	−0.0812***	−0.0813***	−0.0796***
	(0.0417)	(0.0631)	(0.0431)	(0.2204)	(0.2571)	(0.3852)	(0.0029)	(0.0035)	(0.0056)
CGI	1.2768***	1.6396***	0.3416**	−4.3944***	−6.6575***	1.5881	−0.0735**	−0.0747*	−0.0511
	(0.3247)	(0.4151)	(0.1639)	(1.5809)	(1.9719)	(2.6407)	(0.0337)	(0.0452)	(0.0474)
Lncapi	17.1721***	19.8445***	6.6768***	−5.3027***	−7.2081***	−2.4922	−0.2476***	−0.3423***	−0.0125
	(1.4570)	(1.6719)	(1.6560)	(1.2561)	(1.6447)	(1.7547)	(0.0283)	(0.0341)	(0.0460)
FAR	−0.0944***	−0.0899*	−0.0246	−0.9793***	−1.6295***	−0.3538	−0.0043*	−0.0076**	−0.0032
	(0.0257)	(0.0495)	(0.0200)	(0.1387)	(0.1878)	(0.2485)	(0.0023)	(0.0034)	(0.0033)
Cash	−0.0310	0.0638	−0.1066	161.4776***	165.1117***	147.5773***	1.4317***	1.4142***	1.4549***
	(0.2565)	(0.4161)	(0.1743)	(9.7814)	(11.3813)	(18.3660)	(0.0738)	(0.0767)	(0.1926)
Inventory	−0.0023	0.0016	−0.0054	−0.0956	−0.0294	−0.2751***	0.0005	−0.0001	0.0025
	(0.0050)	(0.0074)	(0.0033)	(0.0685)	(0.0929)	(0.0637)	(0.0008)	(0.0009)	(0.0016)
Age	0.0271	0.1860***	−0.0643	−0.2212	0.2628	−0.8393**	0.0084*	0.0171**	−0.0020
	(0.0380)	(0.0653)	(0.0447)	(0.3740)	(0.5855)	(0.3747)	(0.0046)	(0.0068)	(0.0057)
State	−2.4021***	−3.1639***	−0.5481*	−8.9748*	−7.2030	−4.8101	0.2187***	0.4078***	−0.0631
	(0.7000)	(1.1029)	(0.3279)	(5.1216)	(7.8679)	(7.1624)	(0.0709)	(0.1061)	(0.0987)
Constant	−346.5364***	−416.6534***	−128.8929***	300.2795***	310.4327***	413.4403***	10.2792***	11.7511***	6.3014***
	(28.1489)	(32.9389)	(29.1815)	(28.6109)	(37.5178)	(78.6231)	(0.6136)	(0.7348)	(1.0787)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	8991	5501	3490	8991	5501	3490	8879	5411	3468
R^2	0.3430	0.4811	0.2428	0.6682	0.6765	0.6510	0.6432	0.6656	0.5949

Notes: Robust standard errors are presented in parentheses.
*** Represent the significance level at 1%.
** Represent the significance level at 5%.
* Represent the significance level at 10%.

governance quality, especially when the external economic situation is unfavorable. Enterprise management should not blindly rely on financial leverage and should adjust company strategy according to market changes. We likewise estimate the expected value of corporate governance quality following Kose et al. (2009) and find that it is difficult to make firms' financial leverage beneficial for corporate performance in a short term. This finding reveals that "improving corporate governance quality" is a protracted battle and requires persistence.

6. Conclusion

This study contributes to the body of empirical research on the causal effect of corporate governance quality and financial leverage and explores how corporate governance influences a firm's leverage ratio. It also contributes to the debate on the economic impacts of corporate governance quality and financial leverage. Using a sample of Chinese non-financial listed firms during 2000–2018, we explore the relationship between corporate governance quality and financial leverage as well as financial performance.

We find a significant and negative impact of improved governance quality on leverage. Our results are robust in both the full sample and split sample analyses by ownership, listing boards, industries, and corporate scale. Our findings also hold after the series of robustness analyses are performed. With respect to the mechanism analysis, the negative relationship between corporate governance quality and financial leverage is mediated by internal and equity financing. In particular, corporate governance can realize the deleveraging effect by increasing internal or equity financing. We find that the leverage has a negative impact on corporate financial performance in the full sample and the split sample of economic downward period. However, this adverse effect could be partially offset by corporate governance quality. We also estimate the values that corporate governance quality needs to achieve to make the financial leverage of firms beneficial for performance to provide directions and potential improved spaces for corporate governance.

Our results support the view that corporate governance quality reduces firms' financial leverage and highlights the importance of improved corporate governance for state-owned, high pollution, and other traditional industry firms. Especially, under the unfavorable external situation that the Chinese economy currently faces, firms have to improve their corporate management to increase efficiency, innovate, and reduce the dependence on debt financing. Such measures reduce the potential threats of bankruptcy and financial crisis. The heterogeneous effects of corporate governance on the financial leverage of enterprises with different characteristics also highlight the importance of heterogeneity in policy making and implementation. For an enterprise with state ownership or high pollution industrial intensity, the improvement of corporate governance will contribute to the reform of SOEs and the ecological civilization advocated by the recent economic development of China. From the potential values that corporate governance quality needs to achieve, we also find it difficult to make the financial leverage of firms beneficial for performance in a short time. Thus, "improving corporate governance quality" is a protracted battle that needs persistence. These policy implications are important for both listed firms and the government authorities that supervise these public firms.

This study has some limitations. First, we could not include a complete set of CGIs, such as the concurrent appointment of the chairman and executive compensation. Second, while the overall effect of CGI on financial leverage is explored, we do not examine which factors in the corporate governance system play the decisive or ineffective role. Third, the endogenous treatment of corporate governance is not well. One of the best alternatives is to find more appropriate instrumental variables or use natural quasi experiments. Future research should consider these factors to make more practical findings.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.irfa.2020.101652.

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