

The Share-Pledging of Controlling Shareholder and Corporate Operation Risk The Empirical Evidence from China's A-Shares Listed Companies

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Abstract. Share-pledging has become a widely used financing method for listed companies to meet their capital needs. However, it may also influence the operation risk of companies. Using the annual data from CSMAR and WIND database, we obtain 11,298 listed companies from 2009 to 2019 and examine the impact of controlling shareholder's share-pledging on corporate operation risk. Through Stata16.0, we regress and empirically find that, the share-pledging of controlling shareholder can significantly increase the corporate operation risk based on the double fixed effect model. Furthermore, after considering the different nature of property rights in listed companies, we prove that controlling shareholders' share-pledging has more significantly positive influence on the corporate operation risk in non-SOEs than in SOEs. Our findings can remind listed companies to take reasonable financing means and help regulators formulate policies to protect the rights and interests of minority shareholders.

Keywords: Controlling shareholder \cdot Share-pledging \cdot Operation risk \cdot Nature of property rights

1 Introduction

Share-pledging is the behavior that shareholders use their stocks as the pledge object in exchange for the required funds. In recent years, it has become a common phenomenon for the controlling shareholders to pledge their stocks in order to meet the capital needs [5]. As of the first half of 2021, there are 2,533 among the 4,074 A-share listed companies with pledged shares, accounting for 62.17%, and the total market value of the pledge has reached 4,174.71 billion. And there are only 1541 listed companies without sharepledging. On the one hand, the controlling shareholder of listed company can easily

borrow funds from financial institutions through share-pledging, reducing the pressure of cash flow with the development of company. On the other hand, as a new way of financing, the controlling shareholder's share-pledging has great impact on the operating risk of enterprises. Therefore, what's the relationship between the share-pledging and corporate operation risk? What's the difference on the impact of share-pledging on the corporate operation risk between SOEs and non-SOEs? This paper will focus on the impact of the controlling shareholder's share-pledging on the operation risk of the enterprises. Furthermore, this paper studies the relationship between the controlling shareholder's share-pledging and corporate operation risk under the different property rights of listed companies, to provide the theoretical basis and reasonable suggestions for the healthy development of China's capital market.

Using the annual data of listed companies in China from 2009 to 2019, this paper studies the impact of controlling shareholder's share-pledging on corporate operation risk. We find that, the share-pledging of controlling shareholder can increase the corporate operation risk. Furthermore, after considering the different nature of property rights in listed companies, the impact of share-pledging of controlling shareholders on corporate operation risks varies from companies to companies. Controlling shareholders' share-pledging has more significantly positive influence on the corporate operation risk in non-SOEs than in SOEs. There are many innovations in this paper. Firstly, we discuss the economic consequences of share-pledging from the perspective of enterprise operating risk, while most of the existing literature focuses on the impact of share-pledging on enterprise value, enterprise innovation investment, earnings management and other aspects, rather than the enterprise operation risk. This paper provides a new perspective on the researches about the economic consequences of share-pledging. Secondly, this paper makes the group test for the impact of share-pledging on corporate operation risk based on property rights, which is conducive to enriching the research on share-pledging and operation risk.

2 Literature Review and Research Hypothesis

2.1 The Theoretical Analysis on Share-Pledging and Operation Risk

The controlling shareholders dominate the development of enterprise as the leader of managerial decision-making. In the ever-changing capital market, the financing decisions have also become an indispensable part of the future operation of enterprises. Share-pledging provides companies with lower financing costs and convenient financing channels, making it easier for companies to obtain funding sources. But with the development of this new way of financing, people have been concerned about the problems coming with it. In China's capital market, the share-pledging business is characterized by a high proportion and a large scale, which is not conducive to the long-term development of listed companies. Therefore, how does the share-pledging of controlling shareholder affect the corporate operating risk?

Firstly, the share-pledging of controlling shareholders can aggravate the moral hazard problem of listed companies. The share-pledging weakens the control of controlling shareholders over the listed company, and out of the consideration of their own interests, the controlling shareholders tend to damage the interests of small and medium shareholders. Besides, the share-pledging will increase the separation of the pledgee's rights of control and rights of cash flow, which will lead to agency problems and damage the market value of listed companies [3]. Secondly, large shareholders who pledge shares are more likely to embezzle funds from listed companies [10]. The controlling shareholder "hollow out" the listed company through share-pledging, which in turn affects the company's operation [14]. If the capital of listed companies is occupied by the controlling shareholder, it will weaken the financing ability of the companies and increase the financing cost [6]. Controlling shareholders' behavior of "hollowing out" listed enterprises make small and medium shareholders unable to obtain equally interests and may sell stocks. This will lead the stock price of listed companies to fall, resulting in an increase in the cost of corporate equity financing [2, 7]. Share-pledging increases the information asymmetry between listed companies and fund providers, causing changes in the expectations and judgments of fund providers, thereby increasing the financing constraints of enterprises [12]. In an operating environment with rising financing constraints, companies may face liquidity risks, which will ultimately affect their operations. In addition, according to article 70 of the Guarantee Law, in the case of a listed company's share-pledging, if the listed company's stock price falls below the warning line, the pledged shares of the controlling shareholder will be forcibly liquidated, which will make the controlling shareholders lose the right to control the company, and leads to an increase in the uncertainty of the company's internal operations [4]. Based on this, this paper proposes the first hypothesis H1.

H1: The share-pledging of controlling shareholder is positively correlated with the enterprise operating risk.

2.2 The Nature of the Share-Pledging Companies' Property Rights and Operation Risk

With the implicit government guarantee, financial institutions are more willing to lend to SOEs than to non-SOEs. In times of financial difficulties, local governments are more inclined to provide assistance to SOEs [10]. Therefore, non-SOEs face with the stronger financing constraints and prefer the financing method of share-pledging. What's more, SOEs play an important role in our country, not only to promote economic development, but also to play a role in stabilizing the overall situation. In order to prevent the loss of state-owned assets, the government has set up multiple thresholds for the transfer of state-owned property rights. Therefore, the final transfer of control rights of state-owned enterprises can only be implemented after multiple procedures for approval. SOEs face with lower risk of control transfer after share-pledging compared with non-SOEs. In addition, the controlling shareholders of SOEs are not only supervised by small and medium shareholders, but also supervised by the State-owned Assets Supervision and Administration Commission and other institutions, thus weakening the conflict of interests between the controlling shareholders and small and medium shareholders of state-owned enterprises. Then, this paper proposes the second hypothesis H2.

H2: Controlling shareholders' share-pledging has more significantly positive influence on the corporate operation risk in non-SOEs than in SOEs.

3 Research Design

3.1 Sample Data

Our sample covers the data of listed companies in China from 2009 to 2019. After excluding ST companies, financial companies and missing data, the final sample covers 11,298 listed companies. We control for year- and industry-fixed effect. All variables are winsorized at the 99% level. We collect data from China Stock Market and Accounting Research (CSMAR) database, and Wind Information Inc. (WIND database). Stata16.0 is used for empirical analysis.

3.2 Definition of Variables

3.2.1 Corporate Operating Risk

John et al. (2008) and Acharya et al. (2011) proposed that the degree of corporate earnings volatility can be used to measure corporate operating risks [1, 8]. The calculation formula is as follows.

$$\delta_{i,t} = \sqrt{\frac{1}{T-1} \sum_{t=1}^{T} (E_{i,t} - \frac{1}{T} \sum_{t=1}^{T} E_{i,t})^2} |T| = 4$$
(1)

$$E_{i,t} = \frac{EBIT_{i,t}}{A_{i,t-1}} \tag{2}$$

where $\delta_{i,t}$ is the operating risk of the *i* company in year *t*. *EBIT*_{*i,t*} is the earnings before interest, tax, depreciation and amortization of the *i* company in year *t*. $A_{i,t-1}$ is the total assets of the *i* company in year t - 1. With reference to this formula, we calculate the standard deviation of the rolling value of the *EBIT* from year t - 4 to t - 1. Corporate operating risk (*RISK*) is measured by the standard deviation of the *EBIT* margin.

3.2.2 Equity Pledge

Dummy variable in Eq. (3) is controlling shareholder's equity pledge (*PLD*). *PLD* equals 1 if the controlling shareholder of the listed company has controlling shareholder behavior at the end of the year and otherwise equals 0 [9].

3.2.3 Control Variables

Following existing literature, this paper introduces factors that may affect the company's operating risk as control variables including company size (*SIZE*), company establishment years (*FIRMAGE*), total asset turnover rate (*ATO*), equity balance degree (*Balance*), institutional investor shareholding ratio (*INST*), the number of directors (*Board*), Tobin Q value (*TobinQ*), audit firm selection (Big4). Among them, the company size (*SIZE*) is expressed by the natural logarithm of the annual total assets; the company's establishment years (*FIRMAGE*) is expressed by Ln (the current year – 1 the company establishment year + 1); the total asset turnover rate (*ATO*) is expressed through ratio

of the operating income to the average total assets; equity balance degree (*Balance*) is expressed by the ratio of the sum of the shareholding of the second to five largest shareholders to the shareholding ratio of the first largest shareholder; the institutional investor shareholding ratio (*INST*) is expressed by the ratio of the total number of shares held by institutional investors to the circulating share capital; the number of directors (*Board*) is calculated by Ln (the number of directors); Tobin Q value (*TobinQ*) is represented by (tradable stock market value + number of non-tradable shares * net assets per share + book value of liabilities)/total assets; audit firm selection (*Big4*) is 1 if the company has been audited by the Big Four (PwC, Deloitte, KPMG, Ernst & Young), otherwise it is 0. We control for year- and industry-fixed effects.

3.3 Model Construction

According to the above analysis, we build following model to test the hypothesis H1, the regression model is shown as Eq. (3).

$$Risk_{i,t} = \beta_0 + \beta_1 PLD_{i,t} + \beta_i Controls_{i,t} + \varepsilon_{i,t}$$
(3)

In order to verify hypothesis H2, the regression model is shown as Eq. (4).

$$Risk_{i,t} = \beta_0 + \beta_1 PLD_{i,t} + \beta_2 SOE_{i,t} + \beta_3 PLD * SOE_{i,t} + \beta_i Controls_{i,t} + \varepsilon_{i,t}$$
(4)

where *SOE* is the property right of the enterprise, which is 1 for state-owned holding enterprises, and 0 for others. *PLD*SOE* is the interaction term of equity pledge and property rights of the controlling shareholder. The meanings and calculation methods of other variables are consistent with Table 1.

4 Empirical Results

4.1 Descriptive Statistics

As shown in Table 2, the average value of operating risk (*RISK*) is 0.0525, the minimum value is 0.0025, and the maximum value is 2.4851. This indicates that the operating risk (*RISK*) of listed companies in China varies greatly. For the reason that the operating risk is a positive indicator, the larger the value, the greater the operating risk of the enterprise. The average value of the explanatory variable controlling shareholder's equity pledge ratio (*PLD*) is 0.3792, indicating that during the entire sample period, the listed companies in China have the average pledge ratio of 37.92%.

4.2 Correlation Analysis

Using Stata16, we explore the correlations between the variables, and the results are shown in Table 3. It can be seen that the maximum correlation coefficient among the variables is only 0.381, indicating that there is no multicollinearity problem. In addition, there is a positive relationship between corporate operating risk and controlling shareholder's equity pledge, which is also significant at the 1% level. This shows that the equity pledge of the controlling shareholder of the listed company will increase the corporate operating risk, and to a certain extent, the hypothesis H1 of this paper is preliminarily verified.

	Variables	Variables' name	Definitions
Explained variable	Risk	Corporate operating risk	Cumulative distribution probability of standard deviation of EBIT
Control variable	PLD	Controlling shareholder equity pledge	Whether the controlling shareholder of the listed company has controlling shareholder behavior at the end of the year, if yes, it is 1, and if not, it is 0
Explanatory variables	SIZE	Company Size	Natural logarithm of annual total assets
	FIRMAGE	Year of establishment of the company	Ln (year of current year – year of establishment of the company + 1)
	ATO	Total asset turnover	Operating income divided by total average assets
	Balance	Equity balance	The ratio of the sum of the shareholding of the second to five largest shareholders to the shareholding ratio of the first largest shareholder
	INST	Institutional investor shareholding	Total institutional investor holdings divided by outstanding share capital
	Board	Number of directors	The natural logarithm of the number of directors
	Tobin Q	Tobin Q	(market value of tradable shares + number of non-tradable shares * net assets per share + book value of liabilities) / total assets
	Big4	Whether the company has been audited by the Big Four	1 if the company has been audited by the Big Four (PwC, Deloitte, KPMG, Ernst & Young), otherwise 0
	YEAR	Year	Annual dummy variable
	INDUSTRY	Industry	Industry dummy variable

Table 1. Definitions of	variables.
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Variables	Observations	Mean	S.D.	Min	Max
RISK	11,298	0.0525	0.1427	0.0025	2.4851
PLD	11,298	0.3792	0.4852	0.0000	1.0000
SOE	11,298	0.4935	0.4999	0.0000	1.0000
PLD*SOE	11,298	0.0680	0.2517	0.0000	1.0000
FirmAge	11,298	2.8558	0.3107	1.6094	3.5553
Size	11,298	22.647	1.2678	19.6475	26.3950
ATO	11,298	0.6858	0.4684	0.0531	2.9066
Big4	11,298	0.0864	0.2809	0.0000	1.0000
Balance	11,298	0.6256	0.5655	0.0177	2.9614
Board	11,285	2.1667	0.1984	1.6094	2.7081
INST	11,288	0.4659	0.2237	0.0000	0.8894
TobinQ	11,298	1.9851	1.2307	0.8153	16.647

Table 2. Descriptive statistics of main variables.

Table 3. Correlation test of main variables.

Variables	RISK	PLD	Firm Age	Size	ATO	Big4	Balance	Board	INST	TobinQ
RISK	1.000									
PLD	0.058***	1.000								
Firm Age	0.052***	0.030***	1.000							
Size	0.064***	-0.096***	0.183***	1.000						
ATO	-0.015^{*}	-0.088^{***}	-0.044***	-0.024**	1.000					
Big4	-0.023**	-0.134***	0.018*	0.378***	0.036***	1.000				
Balance	0.0000	0.090***	0.035***	-0.040^{***}	-0.064***	-0.019**	1.000			
Board	0.004	-0.162***	-0.012	0.215***	0.014	0.103***	0.017*	1.000		
INST	0.016*	-0.195***	0.006***	0.381***	0.099***	0.242***	-0.174***	0.167***	1.000	
TobinQ	-0.026***	0.048***	-0.161***	-0.460^{***}	0.031***	-0.123***	0.068***	-0.125***	0.006	1.000

4.3 Analysis of Regression Results

In order to study the relationship between controlling shareholder's equity pledge and corporate operating risk, this paper uses the controlling shareholder's equity pledge (*PLD*) dummy variable to measure the controlling shareholder's equity pledge behavior and uses Eq. (3) for empirical testing. Following previous studies, this paper uses a double fixed effect model for regression to eliminate the possible influence of time and industry changes on the estimated results. The detailed results are shown in Table 4.

As shown in the first column of Table 4, when no control variable is added, the regression coefficient of *PLD* is 0.017, and the *p* value is less than 0.01, indicating that there is a positive correlation between the controlling shareholder's equity pledge and the enterprise's operating risk at the level of 1%. As shown in the second column of

Variables	RISK		
	(1)	(2)	
PLD	0.0170 ^{***} (0.0028)	0.0227 ^{***} (0.0029)	
Firm Age		0.0354 ^{***} (0.0049)	
Size		0.0115 ^{***} (0.0015)	
ATO		0.0049 (0.0033)	
Big4		-0.0240 ^{***} (0.0052)	
Balance		0.0024 (0.0024)	
Board		-0.0142 ^{**} (0.0071)	
INST		-0.0062 (0.0070)	
Tobin Q		0.0008 (0.0014)	
Constant	0.0460 ^{***} (0.0017)	-0.2890 ^{***} (0.0375)	
Industry	YES	YES	
Year	YES	YES	
Observations	11,298	11,275	
R-squared	0.0030	0.0430	

Table 4. Equity pledge of controlling shareholder and enterprise operation risk.

Table 4, after including the control variable, the regression coefficient of *PLD* is 0.0227, and the *p* value is less than 0.01, which further verifies that there is a positive relationship between the controlling shareholder's equity pledge and the enterprise's operating risk at a significant level of 1%. This means that the controlling shareholder's equity pledge in a listed company will significantly increase the business risk of the enterprise, which verifies the hypothesis H1 above.

Furthermore, in order to test the impact of the property rights of enterprises on the corporate operating risk, this paper also uses a double fixed effect model for regression analysis. The results of Eq. (4) are shown in Table 5.

In this paper, the property rights of enterprises are divided into state-owned enterprises and private enterprises. It can be seen from the first column of Table 5 that the interactive item *PLD*SOE* has a negative correlation with the enterprise's operating risk, and it is significant at the 1% level. This shows that, compared with state-owned

Variables	RISK				
	(1)	(2)	(3)		
	All companies	State-owned enterprises	Non-state-owned enterprises		
PLD	0.0192***	0.00717	0.0169***		
	(0.0039)	(0.0045)	(0.0047)		
SOE	-0.0174***				
	(0.0041)				
PLD*SOE	-0.0140**				
	(0.0068)				
Firm Age	0.0393***	0.0329***	0.0374***		
	(0.0050)	(0.0067)	(0.0073)		
Size	0.0121***	0.00590***	0.0196***		
	(0.0015)	(0.0017)	(0.0026)		
ATO	0.0048	0.0016	0.0044		
	(0.0033)	(0.0036)	(0.0058)		
Big4	-0.0249^{***}	-0.0177^{***}	-0.0327^{***}		
	(0.0052)	(0.0050)	(0.0110)		
Balance	-0.0007	0.0052	-0.0044		
	(0.0025)	(0.0033)	(0.0037)		
Board	-0.0075	-0.0138^{*}	-0.0115		
	(0.0072)	(0.0080)	(0.0120)		
INST	0.0017	-0.0119	-0.0011		
	(0.0071)	(0.0092)	(0.0109)		
Tobin Q	3.97e-05	-0.0005	0.00158		
	(0.0014)	(0.0018)	(0.0021)		
Constant	-0.3160***	-0.1420^{***}	-0.4580^{***}		
	(0.0377)	(0.0441)	(0.0671)		
Industry	YES	YES	YES		
Year	YES	YES	YES		
Observations	11,275	5,565	5,710		
R-squared	0.046	0.066	0.056		

Table 5. The property rights nature of companies participating in the pledge and enterprise operation risk.

enterprises, the controlling shareholder's equity pledge in non-state-owned enterprises has a stronger impact on raising business risk (*RISK*). In addition, the state-owned enterprises and private enterprises are tested in groups. The group test results show that the regression coefficient between the controlling shareholder pledge (*PLD*) and operating risk (*RISK*) of the sample state-owned enterprises is -0.00717, but there is no significant relationship between them. In non-state-owned enterprises, the estimated coefficient between controlling shareholder pledge and operating risk (*RISK*) is 0.0169, which is significant at the 1% level. The regression results further support the hypothesis H2 that non-state-owned enterprise controlling shareholder equity pledge (*PLD*) increases more operating risk.

5 Robustness Analysis

5.1 Reassessment of Business Risk

In this section, we do robustness check through measuring corporate operation risk refers to Wang et al. (2017) [13]. We use the cumulative distribution probability of the standard deviation of the profit rate before interest, tax, depreciation and amortization to measure the business risk of the enterprise ($RISK_1$). The regression model is shown as Eq. (5).

$$Risk_{1i,t} = \beta_0 + \beta_1 PLD_{i,t} + \beta_i Controls_{i,t} + \varepsilon_{i,t}$$
(5)

where *RISK_1* is the cumulative distribution probability of the standard deviation of the profit rate before interest, tax, depreciation and amortization, and other variables are consistent with Table 1. The regression results are shown in Table 6. The empirical results show that the conclusion is consistent with the hypothesis H1 after re-measurement of the enterprise's operating risk.

5.2 Controlling Shareholder Equity Pledge Re-measurement

In order to further test the robustness of the empirical results, this paper adopts another method to measure the equity pledge ratio (PLD_1) . We construct the following Eq. (6) for testing.

$$Risk_{i,t} = \beta_0 + \beta_1 PLD_{1i,t} + \beta_i Controls_{i,t} + \varepsilon_{i,t}$$
(6)

The variables are the same as in Table 1. The results are shown in the second column of Table 6. The results show that after replacing the controlling shareholder's equity pledge index, it is still the same as the original conclusion. The above empirical tests verify the robustness of the results.

 Table 6. Results of controlling shareholder's equity pledge and operating risk re-measurement test.

Variables	(1) <i>RISK_1</i>	(2)RISK
PLD	0.0394 ^{***} (0.0056)	
PLD_1		0.0392 ^{***} (0.0043)

(continued)

Variables	(1) <i>RISK_1</i>	(2)RISK
Firm Age	0.0152 (0.0093)	0.0331 ^{***} (0.0049)
Size	0.0273 ^{***} (0.0029)	0.0118 ^{***} (0.0015)
ATO	0.0054 (0.0063)	0.0054 (0.0033)
Big4	-0.0443 ^{***} (0.0098)	-0.0234 ^{***} (0.0052)
Balance	0.0150 ^{***} (0.0046)	0.00192 (0.0024)
Board	-0.0379 ^{***} (0.0136)	-0.0127 [*] (0.0071)
INST	-0.0503 ^{***} (0.0134)	-0.0068 (0.0070)
Tobin Q	0.0233 ^{***} (0.0027)	0.0011 (0.0014)
Constant	-0.1840 ^{***} (0.0713)	-0.2910 ^{***} (0.0374)
Industry	YES	YES
Year	YES	YES
Observations	11,275	11,275
R-squared	0.0690	0.0450

 Table 6. (continued)

6 Conclusion

The controlling shareholder's equity pledge financing behavior is more and more common in China. Previous literature shows that, the equity pledge of controlling shareholders will have an impact on the value of listed companies, innovation investment, earnings management, and risk-taking levels. However, few literature discusses the relationship between the controlling shareholder's equity pledge and the enterprise's operating risk. This paper studies China's listed companies from 2009 to 2019, and the empirical results show that the equity pledge of the controlling shareholder is positively correlated with the operating risk of the enterprise. Compared with state-owned enterprises, there is a more obvious positive relationship between the non-state-owned enterprise controlling shareholder's equity pledge and enterprise operating risk. Operating risk is closely related to the controlling shareholder of an enterprise. In order to prevent the emergence of systemic risks, on the one hand, decision makers can improve the supervision system, such as restricting the voting rights of controlling shareholders with a certain pledge rate and improving equity pledge disclosure system. It is useful to unblock the financing channels of non-state-owned enterprises, reduce financing costs. On the other hand, the essential reason why controlling shareholders frequently "hollow out" listed companies is that the cost of illegality is too low. Financial regulators should severely crack down on the transfer of shareholders' interests, formulate strict punishment mechanisms, and improve legal systems.

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