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EQUITY PLEDGE, PLEDGOR TYPE AND INVESTMENT EFFICIENCY

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Abstract

Equity pledging is susceptible to agency problems and substantial risk, resulting in inefficient corporate investment. We show that the negative impact is not just induced by controlling shareholders but also pledged by non-controlling shareholders. Our results add that SOEs with control rights via controlling shareholders or actual controllers can mitigate investment inefficiency problems. We conclude that pledgor-type matters and the impact of non-controlling shareholders' pledges should not be neglected.

Keywords: agency problem, equity pledge, controlling shareholders, non-controlling shareholders, actual controller, investment efficiency

JEL Codes: G3

1. Introduction

Equity pledging is a standard financing method for controlling shareholders in China to raise capital while retaining their control rights. The market for equity pledging in China is enormous. In 2021, pledged shares had a market value of 4.18 trillion yuan (refer to Table 1). Studies find that controlling shareholders' pledges exacerbate agency conflicts due to margin call stress (Chan et al., 2018; Chauhan et al., 2021). If pledgors fail to satisfy the margin call when the pledged share price falls below the threshold, pledgees can forcibly sell the shares, and pledgors risk losing control. Therefore, controlling shareholders are inclined to change their incentives and influence corporate decisions in various ways to avoid margin calls. One way is to alter capital investment risk that can impair corporate investment efficiency.

Pledged firms are incentivized to lower capital investment risk (Chauhan et al., 2018) by reducing capital expenditures, including R&D expenses, compared to non-pledged firms to keep the personal benefits of pledging (Dou et al., 2019). Insiders tend to forgo risky but profitable investment opportunities (Dou et al., 2019) to moderate investment risk directly reflected in the firm's stock return volatility and future stock price crash risk, causing underinvestment problems. In contrast, pledged firms may have a larger risk appetite because the pledgors know that the downside risk is limited. In the worst-case scenario, the pledged shares would be liquidated to meet margin calls. The unlimited upside potential could motivate controlling shareholders to overinvest by undertaking risky but profitable investments to boost share prices at the expense of minority shareholders (Dou et al., 2019;

Ren et al., 2022) or debtholders (Chauhan et al., 2021). In both cases, equity pledges intensify firms' agency problems.

Table 1: Market value of pledged shares from 2014 to 2021

Year	Number of firms with pledged shares	Market value of pledged shares (in trillion yuan)
2014	2,545	2.58
2015	2,774	4.93
2016	2997	5.44
2017	3,433	6.15
2018	3,434	4.23
2019	3,081	4.72
2020	2,632	4.32
2021	2,517	4.18

Note: This table shows the number of firms with pledged shares and the market value of pledged shares in China in trillion yuan. The statistics are sourced from http://www.chinaclear.cn/

However, these studies are limited to controlling shareholders' pledges. We fill the gap by examining the effect of equity pledging by pledgor type on investment efficiency. We identify the pledgors into three main types: controlling shareholders; non-controlling shareholders; and actual controllers. Though non-controlling shareholders are often perceived to exert less impact on corporate decision-making, we argue that non-controlling shareholders' pledges can have an indirect but significant impact on corporate investment efficiency. This is because non-controlling shareholders' pledges are subject to the same margin call pressure that can drive up firms' crash risk. If the pledged share prices fall below the threshold, the pledgees can forcibly sell the shares if the non-controlling shareholders fail to meet the margin calls. The forced selling will add downward pressure to the share prices, and the adverse effects will spill over to other shareholders.

In the event of forced selling, controlling shareholders' wealth will be critically affected, given their substantial interest in the firms. Controlling shareholders are, therefore, incentivized to influence corporate investment decisions to protect their interests, mitigating the firms' adverse spillover effects from non-controlling shareholders' pledges. Depending on the incentives, non-controlling shareholder pledges can also lead to underinvestment or overinvestment problems. Underinvestment tends to happen when the incentive is to sustain the share price, where firms take less to moderate investment risk, forgoing risky but profitable investment opportunities. In contrast, overinvestment is driven by substantial risk-taking to boost the share price. Based on the argument, we expect non-controlling equity pledges to negatively affect firms' investment efficiency.

An actual controller typically refers to a non-shareholder with control rights to influence corporate decisions through investment relationships or other arrangements. In the case of equity pledging, the actual controller is the firm's shareholder that holds and pledges shares of another firm. Actual controllers are expected to use their control rights to influence corporate investment policies. If their goal is to maximize shareholders' wealth, then they are expected to act in the best interest of all shareholders. Suppose their incentives outweigh the shareholders' value-maximizing goal; they will likely influence corporate decisions based on their incentives, such as trading the equity pledging risk with corporate investment.

Our study contributes additional insights to the growing literature on equity pledges. In fact, existing evidence does imply that firm and pledgor type matter, but the evidence is still limited. Previous studies mainly compare the impact of controlling shareholders' pledges between non-state-owned enterprises (non-SOEs) and SOEs (Deren & Ke, 2018; Huang et al., 2022). In addition, Li et al. (2019) examine the impact of the largest shareholders' pledges on crash risk, whereas in our study we

extend by considering pledgor type. We show that the negative effect of equity pledges on investment efficiency is not solely instigated by controlling shareholders, but also by non-controlling shareholders. Actual controllers' pledges do not significantly impact investment efficiency. Probably, this is because actual controllers do not have direct ownership, and their pledges are insubstantial. We add that SOE-related pledgors can mitigate the investment efficiency of pledged firms. In addition, this study contributes to the literature on agency theory. Our findings suggest that pledged shareholders can exacerbate agency conflicts (Chan et al., 2018) by directly or indirectly (in the case of non-controlling shareholders' pledges) influencing corporate investment decisions to reduce the riskiness of firms caused by equity pledging. This results in inefficient investment at the expense of non-pledged shareholders and other stakeholders.

The remaining sections of the paper are structured as follows: Section 2 details the data and methodology. The results are discussed in Section 3, and the study is concluded in Section 4.

2. Data and methodology

Our sample consists of 3,434 Chinese A-share listed firms on the Shanghai and Shenzhen stock exchanges from 2010 to 2020. We exclude financial firms, special treatment firms (ST and *ST firms), or suspended firms with delisting risks to control for the differences in the risk characteristics. We have an unbalanced panel dataset of 19,072 firm-year observations. The dataset is collected from the Wind database. The continuous variables are winsorized at 1% in each tail to control for potential outliers.

Investment efficiency, *InvEff*, is measured using residuals, $\varepsilon_{i,t}$, derived from Richardson's (2006) investment expectation model as follows.

$$Inv_{i,t} = \beta_0 + \beta_1 Q_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Lev_{i,t-1} + \beta_4 Cash_{i,t-1} + \beta_5 Age_{i,t-1} + \beta_6 Return_{i,t-1} + \beta_{17} Inv_{i,t-1} + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (1)$$

$\varepsilon_{i,t}$ is the difference between actual and expected investment level. A higher $\varepsilon_{i,t}$ indicates a higher level of investment inefficiency. We multiple $|\varepsilon_{i,t}|$ with -1, so that a higher $-|\varepsilon_{i,t}|$ denotes a higher investment efficiency because there is a lower deviation from the expected investment (Cao et al., 2020; Gomariz & Ballesta, 2014). We test our hypothesis using the multivariate panel data regression model, controlling for year and industry-fixed effects, with standard errors clustered at the firm level.

$$InvEff_{i,t} = \beta_0 + \beta_1 Pledge_{i,t} + \beta_2 Growth_{i,t} + \beta_3 Size_{i,t} + \beta_4 Lev_{i,t} + \beta_5 Cash_{i,t} + \beta_6 Age_{i,t} + \beta_7 ROA_{i,t} + \beta_8 Tangibility_{i,t} + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (2)$$

Equity pledge is measured by a dummy variable, *D_Pledge* and pledge ratio, *Pledge*. We expect β_1 to be negative, implying that share pledging leads to firms' investment inefficiency.

We categorize the pledge ratio by controlling, non-controlling, and actual controllers. We also control for growth, firm size and age, leverage levels, cash flows, and profitability, which commonly affect investment efficiency. Table A lists the descriptions of the variables.

3. Results and Discussion

From Table 2, the mean (median) values of *Inveff, Overinv*, and *Underinv* are -0.0372 (-0.0239), 0.0491 (0.0259), and -0.0301 (-0.0233), respectively. Consistent with Huang et al. (2022), Chinese firms are inclined to underinvestment problems. 46.75% of the observations are pledged firms, where 30.10% are share pledges by controlling shareholders, followed by non-controlling shareholders' pledges of 16.30%, and actual controllers' pledges of 2.19%.

Table 2: Summary statistics

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
InvEff	19072	-0.0372	-0.0239	0.0439	-0.2761	0.0000
OverInv	7172	0.0491	0.0259	0.0615	0.0000	0.2761
UnderInv	11897	-0.0301	-0.0233	0.0260	-0.1217	0.0000
D_Pledge	19072	0.4675	0.0000	0.4990	0.0000	1.0000
D_Controlling	19072	0.3010	0.0000	0.4587	0.0000	1.0000
D_Non-controlling	19072	0.1630	0.0000	0.3694	0.0000	1.0000
D_Actual	19072	0.0219	0.0000	0.1462	0.0000	1.0000
Pledge	19072	0.0741	0.0000	0.1179	0.0000	0.5364
Controlling	19072	0.0448	0.0000	0.0920	0.0000	0.4371
Non-controlling	19072	0.0156	0.0000	0.0478	0.0000	0.2862
Actual	19072	0.0010	0.0000	0.0074	0.0000	0.0651
Q	19072	2.0794	1.6197	1.4013	0.8496	8.8981
Size	19072	22.4173	22.2432	1.2872	19.8653	26.2734
Lev	19072	0.4467	0.4415	0.2035	0.0595	0.9077
Cash	19072	0.1648	0.1364	0.1121	0.0148	0.5812
Age	19072	2.4090	2.4849	0.5842	1.0986	3.2958
Profitability	19072	0.0338	0.0328	0.0636	-0.2391	0.2056
Tangibility	19072	0.4494	0.4384	0.2032	0.0474	0.909

Note: This table summarizes the descriptive statistics of the identified variables. The total sample has 19,072 firm-year observations, where 7,172 firm-year observations are for the overinvestment subsample, and 11,897 firm-year observations are for the underinvestment subsample. The description for each variable is defined in Table A in the appendix.

In columns 1 and 2 of Table 3, *D_Pledge* and *Pledge* are negatively significant at the 1% level, indicating that equity pledging hurts investment efficiency. To avoid margin calls, pledged firms either end up overinvesting or underinvesting. If the pledge firms aim to boost share prices, they will likely take on more investment risk by overinvesting in risky projects. Alternatively, firms may forgo risky investments if firms aim to moderate investment risk to sustain share prices. Our results are also economically significant. Referring to column 2, when the equity pledge increases by 1%, investment efficiency decreases by 1.03% (0.0384/0.0372). The negative impact is greater among the overinvestment firms, where a 1% increase in equity pledging worsens overinvestment by 1.96% (0.0729/0.0372) (column 4) compared to 0.37% (0.0136/0.0372) of underinvestment (column 6).

Table 3: Equity pledge and investment efficiency

	InvEff (1)	InvEff (2)	OverInv (3)	OverInv (4)	UnderInv (5)	UnderInv (6)
D_Pledge	-0.0071***		0.0114***		-0.0028***	
	(0.0000)		(0.0000)		(0.0000)	
Pledge		-0.0384***		0.0729***		-0.0136***
		(0.0000)		(0.0000)		(0.0000)
Q	-0.0017***	-0.0017***	0.0014	0.0015*	-0.0021***	-0.0021***
	(0.0000)	(0.0000)	(0.1116)	(0.0812)	(0.0000)	(0.0000)
Size	0.0022***	0.0020***	-0.0035***	-0.0031***	0.0021***	0.0020***
	(0.0000)	(0.0000)	(0.0001)	(0.0005)	(0.0000)	(0.0000)
Lev	-0.0178***	-0.0168***	0.0409***	0.0386***	0.0001	0.0004
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.9673)	(0.8291)
Cash	-0.0282***	-0.0274***	0.0316***	0.0301***	-0.0263***	-0.0259***
	(0.0000)	(0.0000)	(0.0003)	(0.0004)	(0.0000)	(0.0000)
Age	0.0084***	0.0083***	-0.0116***	-0.0114***	0.0057***	0.0058***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Profitability	-0.0608***	-0.0615***	0.1247***	0.1260***	0.0053	0.0053
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.2677)	(0.2715)
Tangibility	-0.0553***	-0.0553***	0.0930***	0.0928***	-0.0204***	-0.0205***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	-0.0610***	-0.0580***	0.0742***	0.0649***	-0.0739***	-0.0733***
	(0.0000)	(0.0000)	(0.0001)	(0.0004)	(0.0000)	(0.0000)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Adj R^2	0.1085	0.1124	0.1381	0.1480	0.1437	0.1446
Obs	19,072	19,072	7,172	7,172	11,897	11,897

Note: This table reports the regression results of the impact of equity pledging on corporate investment efficiency for the total sample (*InvEff*), overinvestment (*OverInv*), and underinvestment (*UnderInv*) subsamples. The descriptions of the variables are summarized in Table A in the appendix. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Regarding the control variables, large-sized and older firms have higher investment efficiency because these firms are more diversified, established, and have more investment experience. Therefore, they are less likely to have over-and underinvestment problems than small-sized and younger firms (Benlemlih & Bitar, 2018; Chen et al., 2011). However, firms with high growth opportunities, leverage ratio, cash ratio, profitability, and tangibility are associated with lower investment efficiency. High-growth firms are commonly associated with underinvestment, particularly among firms with high agency problems between shareholders and debtholders (Myers, 1977). The leverage ratio accounts for firms' financial risk and constraints (Chen et al., 2011). Firms with higher leverage ratios are less likely to obtain additional financing to finance their investment opportunities, which constrains firms' investment potential. The availability of internal funding can also trigger investment inefficiency. Our results show that firms with higher profitability are induced to overinvest because profitable firms tend to have higher retained earnings.

In Table 4, we categorize the share pledges by the pledgor type. Pledgor type is measured using respective pledge ratio and dummy variable. Columns 1 to 4 show that controlling and non-controlling equity pledges lead to investment inefficiency, which is statistically significant at the 1% level. Column 5 shows that *Actual* is insignificant, but *D_Actual* is marginally significant at the 10% level (column 6). Columns 7 and 8 include the three types of pledgors in the same regression model. The coefficients of *D_Controlling* and *D_Non-controlling* (in column 7) and *Controlling* and *Non-controlling* (in column 8) remain significantly negative at the 1% level, supporting our hypotheses.

Table 4: Pledgor type and investment efficiency

	Investment efficiency (*InvEff*)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_Controlling	-0.0043***						-0.0066***	
	(0.0000)						(0.0000)	
Controlling		-0.0253***						-0.0321***
		(0.0000)						(0.0000)
D_Non-controlling			-0.0049***				-0.0076***	
			(0.0000)				(0.0000)	
Non-Controlling				-0.0498***				-0.0611***
				(0.0000)				(0.0000)
D_Actual					-0.0042		-0.0008	
					(0.1264)		(0.7936)	
Actual Controller						-0.1085*		-0.0228
						(0.0717)		(0.7158)
Q	-0.0016***	-0.0016***	-0.0016***	-0.0017***	-0.0016***	-0.0017***	-0.0017***	-0.0017***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	0.0023***	0.0022***	0.0023***	0.0022***	0.0023***	0.0023***	0.0022***	0.0020***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Lev	-0.0181***	-0.0178***	-0.0192***	-0.0191***	-0.0191***	-0.0191***	-0.0179***	-0.0174***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Cash	-0.0268***	-0.0266***	-0.0274***	-0.0273***	-0.0267***	-0.0267***	-0.0283***	-0.0277***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Age	0.0093***	0.0093***	0.0096***	0.0096***	0.0098***	0.0098***	0.0084***	0.0087***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Profitability	-0.0604***	-0.0605***	-0.0614***	-0.0614***	-0.0608***	-0.0608***	-0.0610***	-0.0610***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Tangibility	-0.0560***	-0.0560***	-0.0563***	-0.0563***	-0.0565***	-0.0565***	-0.0553***	-0.0556***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	-0.0659***	-0.0649***	-0.0678***	-0.0661***	-0.0692***	-0.0689***	-0.0613***	-0.0594***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Adj R^2	0.1049	0.1056	0.1046	0.1059	0.1032	0.1033	0.1083	0.1098
Obs	19,072	19,072	19,072	19,072	19,072	19,072	19,072	19,072

Note: This table reports the regression results of the impact of equity pledging on corporate investment efficiency by the pledgor type. The descriptions of the variables are summarized in Table A in the appendix. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Overall, our results suggest that the negative impact of equity pledges on investment efficiency is not solely driven by controlling shareholders' pledges but also by non-controlling shareholders. In contrast, actual controller pledges have no consistent or significant impact on investment inefficiency. This is likely because actual controllers do not have direct ownership, and their pledges are not substantial (refer to Table 2). Regarding economic magnitude, the adverse effect of equity pledging on investment efficiency is more substantial for non-controlling than controlling shareholders, with an economic magnitude of 1.34% (0.0498/0.0372, column 2) compared to 0.68% (0.0253/0.0372, column 1) if pledges by respective group increases by 1%.

Next, we re-estimate Equation 2 with firm fixed effect to alleviate possible endogeneity concerns because of differences across firms. The results are reported in Table 5. We also control for bias that may be caused by reverse causality and lagged effect. We lag the pledge and control variables by one year (Huang et al., 2022; Wu et al., 2022) so that the study can account for year-end equity pledges' impacts on investment efficiency. The results are reported in Table 6. In both robustness analyses, our results remain consistently significant as those reported in Table 4. Equity pledging is negatively related to investment efficiency, mainly driven by controlling and non-controlling

shareholders' pledges. Actual control pledges are reported to have an insignificant effect on corporate investment efficiency.

Table 5: Controlling for firm fixed effect

	Investment efficiency (*InvEff*)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_Controlling	-0.0053***						-0.0078***	
	(0.0089)						(0.0091)	
Controlling		-0.0287***						-0.0358***
		(0.0081)						(0.0070)
D_Non-controlling			-0.0058***				-0.0089***	
			(0.0051)				(0.0045)	
Non-Controlling				-0.0555***				-0.0671***
				(0.0038)				(0.0038)
D_Actual					-0.0052		-0.0010	
					(0.1479)		(0.7367)	
Actual Controller						-0.1277		-0.0309
						(0.1014)		(0.5974)
Q	-0.0019***	-0.0019***	-0.0019***	-0.0020***	-0.0019***	-0.0020***	-0.0019***	-0.0020***
	(0.0004)	(0.0004)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0004)
Size	0.0025***	0.0025***	0.0026***	0.0026***	0.0027***	0.0027***	0.0024***	0.0023***
	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0002)
Lev	-0.0166***	-0.0161***	-0.0178***	-0.0175***	-0.0176***	-0.0176***	-0.0165***	-0.0157***
	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0002)
Cash	-0.0249***	-0.0248***	-0.0252***	-0.0251***	-0.0243***	-0.0243***	-0.0271***	-0.0262***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Age	0.0099***	0.0100***	0.0103***	0.0103***	0.0105***	0.0105***	0.0089***	0.0094***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Profitability	-0.0575***	-0.0575***	-0.0589***	-0.0587***	-0.0580***	-0.0580***	-0.0585***	-0.0580***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Tangibility	-0.0508***	-0.0509***	-0.0509***	-0.0510***	-0.0508***	-0.0508***	-0.0511***	-0.0511***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	-0.0761***	-0.0761***	-0.0793***	-0.0779***	-0.0818***	-0.0815***	-0.0682***	-0.0689***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Adj R^2	0.0750	0.0757	0.0745	0.0758	0.0724	0.0726	0.0799	0.0809
Obs	19,072	19,072	19,072	19,072	19,072	19,072	19,072	19,072

Note: This table reports the results of the regression that additionally controls for the firm fixed effect to control for potential endogeneity problem due to differences across firms. Three (3) pledgor types are identified, which include equity pledging by (1) controlling shareholders, (2) non-controlling shareholders, and (3) actual controllers. Each pledgor type is measured using a dummy variable and the pledged ratio by respective pledgor type. The descriptions of the variables are summarized in Table A in the appendix. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 6: Controlling for lagged effect

	Investment efficiency (*InvEff*)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.D_Controlling	-0.0039***						-0.0056***	
	(0.0000)						(0.0000)	
L.Controlling		-0.0265***						-0.0321***
		(0.0000)						(0.0000)
L.D_Non-controlling			-0.0034***				-0.0064***	
			(0.0021)				(0.0000)	
L.Non-Controlling				-0.0387***				-0.0555***
				(0.0001)				(0.0000)
L.D_Actual					0.0016		0.0042	
					(0.5285)		(0.1106)	
L.Actual Controller						0.0105		0.0852
						(0.8352)		(0.1037)
L.Q	-0.0052***	-0.0052***	-0.0052***	-0.0052***	-0.0052***	-0.0052***	-0.0052***	-0.0052***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
L.Size	0.0025***	0.0025***	0.0026***	0.0026***	0.0027***	0.0027***	0.0025***	0.0023***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
L.Lev	-0.0066**	-0.0059**	-0.0076**	-0.0075**	-0.0076**	-0.0076**	-0.0062**	-0.0055*
	(0.0277)	(0.0469)	(0.0103)	(0.0118)	(0.0113)	(0.0112)	(0.0361)	(0.0645)
L.Cash	-0.0263***	-0.0261***	-0.0266***	-0.0267***	-0.0259***	-0.0260***	-0.0273***	-0.0270***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
L.Age	0.0066***	0.0064***	0.0069***	0.0069***	0.0072***	0.0072***	0.0060***	0.0060***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
L.Profitability	0.0037	0.0034	0.0027	0.0025	0.0032	0.0032	0.0030	0.0027
	(0.6739)	(0.6922)	(0.7612)	(0.7747)	(0.7163)	(0.7174)	(0.7295)	(0.7604)
L.Tangibility	-0.0321***	-0.0321***	-0.0325***	-0.0326***	-0.0326***	-0.0327***	-0.0316***	-0.0318***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	-0.0763***	-0.0744***	-0.0785***	-0.0770***	-0.0803***	-0.0802***	-0.0720***	-0.0694***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Adj R^2	0.1064	0.1081	0.1057	0.1068	0.1049	0.1049	0.1086	0.1114
Obs	15,284	15,284	15,284	15,284	15,284	15,284	15,284	15,284

Note: This table reports the results of the regression that regress investment efficiency (*InvEff*) on a set of lagged variables. The main independent variables (pledgor type) and control variables are lagged by one-year to control for potential bias due to reverse causality and lagged effect. Three (3) pledgor types are identified, which include equity pledging by (1) controlling shareholders, (2) non-controlling shareholders, and (3) actual controllers. Each pledgor type is measured using a dummy variable and the pledged ratio by respective pledgor type. The descriptions of the variables are summarized in Table A in the appendix. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

In addition, we add that equity pledges by non-SOEs pledgors hurt investment efficiency more than SOEs-related pledgors (columns 1 and 2 in Table 7). This is because SOEs do not pledge their shares for personal loans and are subject to stricter government monitoring and share-pledging regulation. Furthermore, if the share price crash, it is more complicated to liquidate SOEs pledged shares than for non-SOEs (Pang & Wang, 2020). The findings imply that SOEs-related shareholders have lower

incentives to influence corporate policies for personal benefits; instead, they utilize equity pledging as a corporate financing tool.

We also show that SOE-related pledgors can offset the negative impact of equity pledging on investment efficiency. In columns 3 and 5, we interact the pledgor type with dummy SOE. We observe that SOE-related controlling shareholders and actual controllers' pledges enhance investment efficiency. The results are significant at the 1% level, implying that when SOEs hold controlling rights, they can influence corporate decisions in mitigating investment inefficiencies among the pledged firms.

Table 7: SOE-related Pledgor and Investment Efficiency

	InvEff (1)	InvEff (2)	InvEff (3)	InvEff (4)	InvEff (5)
Controlling			-0.0282***		
			(0.0000)		
Non-Controlling				-0.0478***	
				(0.0000)	
Actual Controller					-0.1150*
					(0.0596)
SOE	0.0024		-0.0009	0.0038*	0.0022
	(0.2622)		(0.7877)	(0.0934)	(0.2981)
Non-SOE		-0.0079***			
		(0.0000)			
SOE*Controlling			0.0515***		
			(0.0083)		
SOE*Non-Controlling				-0.0640	
				(0.3678)	
SOE*Actual Controller					0.3827***
					(0.0025)
Q	-0.0016***	-0.0016***	-0.0016***	-0.0017***	-0.0017***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Size	0.0023***	0.0022***	0.0022***	0.0023***	0.0023***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Lev	-0.0193***	-0.0182***	-0.0181***	-0.0193***	-0.0193***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Cash	-0.0266***	-0.0286***	-0.0268***	-0.0274***	-0.0268***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Age	0.0098***	0.0080***	0.0091***	0.0095***	0.0097***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Profitability	-0.0609***	-0.0611***	-0.0607***	-0.0615***	-0.0608***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Tangibility	-0.0566***	-0.0552***	-0.0560***	-0.0564***	-0.0566***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	-0.0694***	-0.0598***	-0.0650***	-0.0661***	-0.0688***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Adj R^2	0.1031	0.1094	0.1062	0.1060	0.1034
Obs	19,072	19,072	19,072	19,072	19,072

Note: Columns 1 and 2 report the regression results that account for the differences between state-owned enterprises (SOEs) and non-SOEs related pledgors. SOE is a dummy variable that takes 1 for SOE-related pledgor and 0 otherwise. In columns 3 to 5, SOE interacts with each pledgor type. Three (3) pledgor types are identified, which include equity pledging by (1) controlling shareholders, (2) non-controlling shareholders, and (3) actual controllers. Each pledgor type is measured using the pledged

ratio. The descriptions of the variables are summarized in Table A in the appendix. The superscripts *, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

4. Conclusion

Existing studies on equity pledging mostly emphasize the impact of controlling shareholders' pledges on firms. We complement the literature by including the pledgor type in the analysis. The pledgors are divided into controlling shareholders, non-controlling shareholders and actual controllers. Our results show that the negative impact of equity pledges is caused by both the controlling and non-controlling shareholders' pledges. SOEs with controlling rights are found to enhance investment efficiency. To better examine the impact of equity pledges on firms, we recommend that future studies consider the purpose of pledges to capture the pledgors' incentives in making corporate decisions.

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Appendix 1: Variables Description

Variables	Description
InvEff	Absolute value of residuals $\varepsilon_{i,t}$ multiple by -1.
OverInv	Positive residual values, $\varepsilon_{i,t}$
UnderInv	Negative residual values, $\varepsilon_{i,t}$
	Dummy variable equals to 1 for:
D_Pledge	pledge firms.
D_Controlling	controlling shareholders' pledge.
D_Non-controlling	non-controllingshareholders' pledge.
D_Actual	actual controllers' pledge.
Pledge	**Number of new shares pledged over number of shares outstanding.**
Controlling	Pledge ratio of controlling shareholders.
Non-controlling	Pledge ratio of non-controlling shareholders.
Actual	Pledge ratio of actual controller.
SOE	A dummy variable equals to 1 for SOE related pledgor, and 0 otherwise.
Q	Tobin's Q
Size	Natural logarithm of total assets.
Lev	Total debt over total assets.
Cash	Cash and cash equivalent over total assets.
Age	Natural logarithm of firm age from incorporation year.
Profitability	Return on assets
Tangibility	Net property, plant and equipment over total assets.