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Share Pledging and Corporate Default Risk: Evidence from the Chinese Stock Market

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Abstract: In this paper, we assess the economic impact of share pledging by focusing on corporate debt default risk, the most disruptive events in the life of a corporation. Using Instrumental Variables and a regulatory change that increasing the possibility of share pledging as a quasi-exogenous shock, we establish that increased share pledging decreases corporate default risk. The baseline results are robust by eliminating the effect of financial crises, adding other control variables, constructing new PSM samples and use other proxies for default risk. Further tests show that the relation is attenuated in higher ownership concentration and lower ex-ante institutional ownership firms. Our results indicate that share pledging can be beneficial to shareholders and important stakeholders like creditors by reducing the likelihood of corporate default. Our paper throws additional light on the economic impact of share pledging. Although several studies argue that share pledging incentivizes corporate insiders to use corporate resources for private benefits and destroy firm value on the Taiwanese stock market, our findings indicate that share pledging facilitates external monitoring and enables creditors to protect themselves. Our overall findings are consistent with prior literature which shows that share pledging improves market value of Chinese A-share listed firms. We believe that as strong government intervention during market downturns may limit A-share listed firms' exposure to downside risk associated, share pledging can play a more positive role in our setting.

Keywords: Share Pledging, Default Risk, Ownership Concentration, Institutional Ownership

1. Introduction

Share pledging, the practice of shareholders use owned stocks as collaterals to secure loans from creditors, is pervasive around the world. [1] However, government regulators are becoming increasingly worried about the potential costs of pledging shares.[2] In this paper, we assess the economic impact of share pledging by focusing on default risk, the most disruptive events in the life of a corporation [4].

The relation between share pledging and corporate default risk is ex-ante ambiguous. When the stock price falls below a threshold, the borrower should pledge more shares or repay their loans; otherwise the creditor will liquidate the pledged shares, pushing the stock price down even further.[3] Therefore, share pledging can expose firms to downside price pressures and increase default risk [7]. Alternatively, collateral can release additional information about the borrower and improve the creditor's incentive to monitor [19]. An increase in pledged shares can decrease default risk by facilitate external monitoring [4].

In this paper, we examine the effect of share pledging on default risk in China, where mandated disclosure of pledged shares and nontrivial collateral amounts enable us to tackle this empirical question.[4] We employ identification strategies

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1 For example, U.S. corporate insiders have pledged at least $15 billion of their owned stocks to secure personal loans by the end of 2015.
Source:
https://www.reuters.com/article/us-usa-executives-loans-idUSKCN0T61Y620151 117.
2 For example, in March 2018, a new rule on pledged-stock loans comes into effect in China, arguing that reckless borrowing by controlling shareholders destabilizes the market.

3 For example, the liquidation of pledged shares contributes to a steep drop in Hong Kong's small-cap Growth Enterprise Market in late June 2017, when 17 stocks fall by more than 40 percent in a single day.
Source: https://www.ft.com/content/881bae58-e3c9-11e7-97e2-916d4fbac0da.
4 In China, the volume of pledged-stock loans reaches 1.28 trillion RMB (US$ 188 billion) by the end of 2016. Source:

including Instrumental Variable (IV) analysis and Differences-in-Differences (DiD) analysis, and observe a significant negative relation between share pledging and default risk.

Our paper throws additional light on the economic impact of share pledging. Although several studies argue that share pledging incentivizes corporate insiders to use corporate resources for private benefits and destroy firm value on the Taiwanese stock market [5, 7, 23], our findings indicate that share pledging facilitates external monitoring and enables creditors to protect themselves. Our overall findings are consistent with Li et al. [14] who show that share pledging improves market value of Chinese A-share listed firms. We believe that as strong government intervention during market downturns may limit A-share listed firms' exposure to downside risk associated, share pledging can play a more positive role in our setting.[5]

2. Data Description and Summary Statistics

2.1. Sample Selection

Our sample consists of A-share listed firms on Shanghai and Shenzhen stock exchanges during the period of 2003-2016. We collect data from the China Stock Market Trading Research database (CSMAR) provided by GuoTaiAn (GTA) Company include (1) annual financial statement, (2) monthly stock return data, and (3) the share pledging data. We exclude financial firms according to the classification standard of the China Securities Regulatory Commission (henceforth CSRC), and drop observations with missing values on main variables. To minimize the effect of outliers, we winsorize all continuous variables at the top and bottom 1%. The sample selection process ends up with a maximum of 13,263 firm-year observations in our baseline regressions.

2.2. Variable Measurements

2.2.1. Measures of Corporate Default Risk

We construct the main dependent variable, *EDF*, by calculating the Naïve default probability measure of expected default frequency following Bharath and Shumway [3]. This measure has been used by prior studies focusing on default risk in the US [11, 6, 9, 22] and recent literature in China [12,

13, 15]. The Naïve model substitutes the distant-to-default measure from Merton [17] into a cumulative standard normal distribution to calculate the probability that the value of a firm's asset will be less than the face value of its debt. A higher *EDF* indicates a higher likelihood of corporate default. Specifically, we calculate *EDF* as follows:

$$DD_{it} = \frac{\log(\frac{Equity_{it} + Debt_{it}}{Debt_{it}}) + (r_{it-1} - \frac{\sigma_{Vit}^2}{2}) \times T_{it}}{\sigma_{Vit} \times \sqrt{T_{it}}} \quad (1)$$

$$\sigma_{Vit} = \frac{Equity_{it}}{Equity_{it} + Debt_{it}} \times \sigma_{Eit} + \frac{Debt_{it}}{Equity_{it} + Debt_{it}} \times (0.05 + 0.25 \times \sigma_{Eit}) \quad (2)$$

$$EDF_{it} = Normal(-DD_{it}) \quad (3)$$

where i donates listed firms and t donates year. In equation (1), we calculate the distant to default (*DD*) according to Merton [17]. The variable $Equity_{it}$ is the market value of equity calculated as the product of stock price and the number of shares outstanding; $Debt_{it}$ is the face value of debt, which is calculated as the sum of current liabilities and one half of long-term debt; r_{it-1} is the lagged one year annual return, which is computed from the monthly stock return one year before; σ_{Eit} is the stock volatility of calculated from the lagged one year monthly stock return; σ_{Vit}, is calculated from σ_{Eit} in Equation (2), proxies the volatility of firm assets; and lastly, T_{it} is set to one year. The distant-to-default (DD_{it}) is constructed as of all sample firms as of the last day of each year. In Equation (3), *Normal (.)* is the cumulative standard normal distribution function. We substitute DD_{it} into this function to calculate EDF_{it}.

2.2.2. Measures of Share Pledging

We then construct the main explanatory variable, *Pledge*. First, we measure share pledging as the amount of shares pledged by shareholders as a percentage of total shares outstanding at the end of the year.

Second, we also use a quasi-exogenous shock to share-pledging in 2013 to identify the real effect of share pledging. Thus, we construct an indicator variable *Treat* to donate firms that are largely affected by the shock. Specifically, following Brogaard et al. [4], we measure the change in *Pledge* from the pre-regulation year 2012 to the post-regulation year 2014, and construct a variable *ΔPledge₋₁ to +1* for each firm. Based on *ΔPledge₋₁ to +1*, we then sort the sample firms into deciles and regard the top three deciles of the distribution representing the firms experiencing the largest increase in share pledging. The dummy variable equals to one if firm i is included in the top three decile of *ΔPledge₋₁ to +1* and zero otherwise. We then construct a dummy variable *Post* to indicate the sub-period before and after the exogenous shock, *Post* equals to one if the year is after 2013 and zero otherwise.

2.2.3. Control Variables

Following Brogaard et al. [4], we include a vector of control variables as follows: *Ln(Equity)*, the logarithm of market value of equity; *Ln(Debt)*, the logarithm of face value of debt;

$1/\sigma_E$, the inverse of annualized stock return volatility; *Excess return*, the difference between annual stock return and market return; *ROA*, the ratio of net income to total asset. Table 1 provides details of definitions of all the variables in this paper.

***Table 1.** Variable definitions.*

Variables	Definitions
EDF	Expected default frequency, computed as N(-DD), where N(.) is the cumulative standard normal distribution function.
Pledge	The amount of shares pledged by shareholders as a percentage of total shares outstanding.
Treat	A dummy variable equals to one if firm *i* is included in the top three decile of Delta_Pledge, and zero otherwise.
Post	A dummy variable that equals to one if the year is after year 2013, and zero otherwise.
LnEquity	The logarithm of market value of equity in year t, the market value of equity is calculated as the product of the number of shares outstanding and the stock price.
LnDebt	The logarithm of the face value of debt in year t, calculated as the sum of debt in current liabilities and one-half of long-term debt.
$1/\sigma_E$	The inverse of annualized stock return volatility in year t, the annualized stock return volatility is calculated as the standard deviation of stock monthly returns over the prior year.
ROA	Return on asset, the ratio of net income to total asset in year t.
ExcessRet	Annual excess return in year t, calculated as the difference between firm stock return and the market return over the same period.

2.3. Summary Statistics

In this section, we report the summary statistics of the main variables. In Table 2, we find that the mean (median) of *EDF* is 0.014 (0), indicating the likelihood of default in Chinese firms is highly right skewed. Besides, the average *EDF* in Chinese firms is relatively lower compared with the average EDF (0.062) of the US firms computed by Brogaard et al. [4]. This may due to the lower tolerant of defaults of the Chinese central and local governments. Therefore, government policies will help to prevent corporate defaults from escalating to a level that would cause systemic risk to the onshore and offshore markets.

We also document that the independent variable *Pledge* has a mean (median) of 0.157 (0.123), indicating about 15.7% of the shares are pledged in the sample. Besides, the mean of the dummy variable *Treat* is 0.373, which represents about 37% of the sample firms are largely affected by the exogenous shock of share pledging in 2013. The mean of *Post* is 0.156, documenting about 15.6% of the observations are in the period after 2013. The other firm variables look relatively standard and also have a reasonable degree of variation, thus we do not describe these summary statistics in detail.

***Table 2.** Summary statistics (full sample).*

Variable	N	Mean	p50	SD	Min	Max
EDF	13263	0.014	0.000	0.082	0.000	0.639
Pledge	13263	0.157	0.123	0.153	0	0.620
Treat	13263	0.373	0	0.484	0	1
Post	13263	0.156	0	0.363	0	1
LnEquity	13263	22.133	22.132	1.069	19.913	25.121
LnDebt	13263	20.718	20.646	1.451	17.253	24.945
$1/\sigma_E$	13263	8.083	7.621	3.303	1.767	21.193
ROA	13263	0.024	0.027	0.070	-0.319	0.193
ExcessRet	13263	-0.003	-0.004	0.021	-0.059	0.073

3. Empirical Specification and Results

3.1. OLS Regression

Before turning to causal interpretations, we examine the general relation between share pledging and corporate default risk. To assess how share pledging affects corporate default risk, we estimate the following model using ordinary least squares (OLS) estimation:

$$EDF_{i,t} = \alpha + \beta_1 Pledge_{i,t} + \beta_2 Control_{i,t}$$
$$+ Fixed\ Effects + \varepsilon_{i,t} \qquad (4)$$

where *i* indexes firm and *t* indexes year. The coefficient on *Pledge*, β_1, is the one with main interest. *Controls* is a vector of control variables presented in Table 1. Besides, we control for both year- and firm-fixed effects to control for the time-variant heterogeneity and time-invariant unobserved heterogeneity at the firm level. Finally, we cluster standard errors at the firm level.

We report estimation results on the raw relation between share pledging and default risk in Column (1), Table 1. In Column (1), we find that the coefficient on *Pledge* is insignificant. The 2008-2009 financial crisis may boost firms' likelihood of default, which may result in an ambiguous estimation in Column (1). In Column (2), to eliminate the effect of the financial crises, we exclude observations during

2006-2009. We obtain positive and significant coefficient on *Pledge*. In Column (3), we include other control variables, such as, the PPE ratio (*PPE*), firm size (*LnAsset*), the SA index (*SA*), net profit (*Profit*), sales growth (*Growth*) and firm transparency (*Transp*) in to our specification. We still find a positive effect of share pledging on the likelihood of corporate default at the 5% level, indicating that higher share pledging is associated with lower default risk to some extent. Besides, the coefficients of all the control variables also have the expected signs as in Brogaard et al. [4].

It is noteworthy that the endogeneity concerns may bias our result because (1) the causality can run from the likelihood of default to the decision of pledging shares; (2) there are omitted variables correlated with both share pledging and default risk. Therefore, a naïve OLS regression may fail to capture the real effect of share pledging on default risk. To that end, we adopt two different identification strategies in the following sections.

Table 3. OLS regressions of share pledging on EDF.

	(1)	(2)	(3)
	Full sample	**2010-2016**	**2010-2016**
Pledge	0.0090	-0.0100[*]	-0.0104[**]
	(1.3461)	(-1.9079)	(-2.3591)
LnEquity	-0.0124[***]	-0.0064[***]	-0.0072[***]
	(-5.4122)	(-4.0739)	(-4.8613)
lnDebt	0.0118[***]	0.0109[***]	0.0016
	(8.3255)	(10.1659)	(1.3408)
$1/\sigma_E$	-0.0009[***]	-0.0007[**]	-0.0003
	(-2.9831)	(-2.3213)	(-1.0464)
ROA	-0.0011	-0.0309[**]	-0.0255[*]
	(-0.0834)	(-2.5266)	(-1.7972)
ExcessRet	-0.0089	0.0118	0.0162
	(-0.2754)	(0.3596)	(0.5190)
PPE			0.0062
			(1.2389)
lnAsset			0.0032
			(0.8004)
SA			0.0069[**]
			(2.2657)
Profit			-0.0000[***]
			(-4.0750)
Growth			0.0007
			(0.7297)
Transp			0.0011
			(0.9569)
_cons	0.0391	-0.1068[***]	-0.0075
	(0.9051)	(-3.5482)	(-0.1086)
Year FE	Y	Y	Y
Firm FE	Y	Y	Y
N	10970	9035	5966
adj. R²	0.0538	0.0916	0.0976

Notes: [*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$, *t* statistics in parentheses.

3.2. An IV approach

In this section, we first use the two-stage least squares (2SLS) approach to correct for the potential bias due to endogeneity in share pledging. We construct two instrument variables, *Pledge_Ind*, the average *Pledge* in the same CSRC 2-digit industry, and *Pledge_Prov*, the average *Pledge* in the same province, excluding firm i's own level of *Pledge*. The strategy of selecting IVs follows Faccio et al. [8]: These two IVs tend to isolate the more enduring and more exogenous component of share pledging by capturing the industry (provincial)-level factors explaining share pledging, while the decision of pledging shares of one firm does not influence the degree of share pledging of other firms.

Table 4 Column (1) reports the first-stage regression, shows that the two IVs perform reasonably well. In the second-stage regression reported in Column (4), the weak and over identification tests confirm that our IVs are statistically valid. The coefficient on *Pledge* is negative and significant, which implies that an increase in pledged shares reduces default risk. Regarding that the financial crisis may bias the estimated results, we further examine the causal in the sample period between 2010 and 2016. In Column (3), the coefficient on *Pledge* is still negative and significant, which confirms previous findings.[6] Regarding that the heteroscedasticity concerns may bias our 2SLS regression, we also estimate a two-stage General Method of Moment (GMM) model to further examine the causal inference. In Column (4) and Column (5), we still find that share pledging has a significantly negative effect on the likelihood of default.

3.3. DiD Analysis

To further deal with potential endogeneity concerns, we rely on regulatory changes that generate plausibly exogenous variations in share pledging. Specifically, we follow Meng et al. [16] and explore a regulatory change in 2013 that permits security companies to lend money to borrowers using pledged shares as collaterals as a quasi-exogenous shock to share pledging. Before 2013, only banks and trust firms can participate in share-pledging activities. On May 24, 2013, the Shanghai Stock Exchange and the China Securities Depository and Clearing Co., Ltd. publish a rule ("The Guidance on Stock Pledge Repurchase Transactions, Registration, and Settlement") to guide the development of share pledging, permitting security companies to provide finance to borrowers based on pledge shares. As security companies require lower interest rates, have fewer restrictions on the usage of the loans, and approve transactions in a

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6 Jiang (2017) indicates that the issue of IV estimates are larger than their corresponding OLS estimates is serious in finance studies, even if for papers published on leading journals. In our setting the ratio of |β_iv| to |β_ols| is about 23 (=-0.2297/0.01). By comparison, this ratio is 15.48 (=1.749/0.113) and 37.92 (=23.891/0.63) for Faccio et al. (2011) and Bernile (2018), two related studies using a similar strategy. Although coming up with a better cure for such problem is beyond this study, we follow Jiang (2017)'s advices to enhance the transparency of the effectiveness of the IV method and suggest audience to interpret the IV results with caution.

quicker manner, this regulatory change encourages share

pledging activities of listed firms.

Table 4. *2SLS Regressions of share pledging on default risk.*

	(1) First-stage	(2) Full sample 2SLS	(3) 2010-2016 2SLS	(4) Full sample GMM	(5) 2010-2016 GMM
Pledge		-0.2297**	-0.4400**	-0.1992**	-0.4066*
		(-2.2955)	(-2.0429)	(-2.1505)	(-1.8433)
Pledge_Ind	0.0002***				
	(4.2075)				
Pledge_Prov	0.0001***				
	(2.7089)				
Controls	Y	Y	Y	Y	Y
Weak identification test		13.345	28.819	10.802	14.760
Hansen J Statistic		0.1686	0.1691	0.2550	0.3000
Year FE	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
N	12902	12902	7889	12902	7889

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, *t st*atistics in parentheses.

Table 5. *PSM regression and post-match diagnostic regression.*

Panel A

	Pre-match (1)	Post-match (2)
LnEquity	0.0291	-0.0209
	(0.7861)	(-0.4257)
LnDebt	0.1234***	-0.0104
	(5.5462)	(-0.1905)
$1/\sigma_E$	.0009	0.0018
	(0.1102)	(0.1806)
ROA	-0.0708	-0.1320
	(-0.1604)	(-0.2663)
ExcessRet	0.6644	-0.2188
	(0.5090)	(-0.1521)
_cons	-2.4031***	-1.4019*
	(-3.6382)	(-1.9285)
Ind FE	Yes	Yes
N	6768	6294
P-value of Chi2	0.0000	0.0002
Pseudo R^2	0.0073	0.0037

Panel B

Propensity scores	Min	P50	Mean	SD	Max
Treat	0.5780	0.6978	0.6976	0.0435	0.8111
Control	0.5781	0.6918	0.6917	0.0432	0.8089
Difference	-0.0001	0.0056	0.0059	0.0002	0.0022

Panel C

	Treat	Control	Difference	P-value
LnEquity	22.392	22.394	-0.002	0.899
LnDebt	21.019	21.018	0.001	0.993
$1/\sigma_E$	8.007	8.015	-0,008	0.894
ROA	0.030	0.029	0.001	0.706
Excessret	-0.002	-0.002	0.000	0.718

The empirical setting resembles Brogaard et al.[4] who employ decimalization as an exogenous shock and examine how stock market liquidity affects corporate default risk. We begin by constructing a treatment group and a control group of firms using propensity-score matching [18, 20]. Specifically, we measure the change in *Pledge* from the pre-regulation year 2012 to the post-regulation year 2014, and construct a variable *ΔPledge$_{-1 to +1}$* for each firm. Based on *ΔPledge$_{-1 to +1}$*, we then sort the sample firms into deciles and regard the top three deciles of the distribution representing the firms experiencing

the largest increase in share pledging. When applying propensity score matching, we estimate a Probit model including all control variables from Equation (4) as well as industry-fixed effects. The dependent variable is equal to one if the firm-year belongs to the treatment deciles (top three deciles) and zero otherwise. We then use the estimated propensity scores to perform nearest-neighbor propensity score matching with replacement, with a propensity score match within 0.01. In particular, each firm in the top three deciles (treatment firms) is matched to a firm from the rest deciles with the closest propensity score (control firms).

The validity of the DID estimator critically depends on the parallel trend assumption, i.e. the underlying trends in the outcome variable should the same for both groups. Following Brogaard et al. [4], we perform three diagnostic tests to verify that the assumption holds in our setting. We summarize the results of three-fold tests in Table 5. [7]

In Panel A, we re-run the Probit model used to estimate propensity scores restricted to the matched sample, and report estimation results in Column (2). Compared to the estimation results on the baseline Probit model in Column (1), the coefficients on all the explanatory variables have smaller magnitude and are not statistically significant, suggesting that there are no observable different characteristics exist between the treatment and control groups for the matched sample. Panel B reports the distribution of the propensity scores for both groups and their differences, and the difference between the propensity scores of the treatment firms and those of the control firms is trivial. In Panel C, we report the univariate comparisons between the treatment and control firms' pre-regulation characteristics. As shown, none of the observed differences between the treatment and control firms' characteristics is statistically significant, suggesting the propensity score matching process removes meaningful observable differences. Therefore, it is more likely that the observed changes in corporate default risk (if any) are caused

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7 We also following Brogaard et al. [4] exactly, and perform a nearest-neighbor propensity score matching without replacement. However, this method looses too many observations. Therefore, we made a trade-off between the two methods and choose to use the matching process with replacement. We also perform the regressions in the PSM sample without replacement and find similar basic results.

only by the exogenous change in share pledging due to the regulation.

We construct the following DiD estimation:

$$EDF_{i,t} = \alpha + \beta_1 Treat_i + \beta_2 Post_{i,t} + \beta_3 Treat_i \times Post_{i,t} + \beta_4 Control_{i,t} + Fixed\ Effects + \varepsilon_{i,t} \qquad (5)$$

in Equation (5), $EDF_{i,t}$ and control variables are defined as in Equation (4). $Treat_i$ is a dummy variable that equals one if the stock i belongs to the treatment group, and zero otherwise. $Post_{i,t}$ is a dummy variable that equals to one if it is year 2013 or after, and zero otherwise. Our variable of interest is the coefficient on the interaction term of $Treat_i$ and $Post_{i,t}$, β_3, which captures the change in default risk for treatment firms relative to benchmark firms subsequent to the regulatory change on share pledging.[8] Lastly, in Equation (5), we also control the year- and firm-fixed effects to control for the time-variant heterogeneity and time-invariant unobserved heterogeneity at the firm level. We cluster standard errors at the firm level.

Then we conduct DiD analysis based on the matched sample. To begin with, we assess the validity of employing the deregulation of short-sales as quasi-exogenous shocks to share pledging. In Table 6 Column (1), we observe negative and significant coefficient on $Treat\times Post$, indicating that the positive shock to share pledging reduces corporate default risk.

To observe the dynamics of corporate default around the time of the regulatory change, we conduct a timing test in Column (2). We introduce four indicator variables: $Before1$, $Current$, $After1$, $After2+$, which equals to one if it is one year prior to/the current year of/one year after/two and more years after/the regulatory change, and zero otherwise. We obtain insignificant coefficient on $Treat\times Before1$, implying that the pretreatment trends in share pledging are indistinguishable for the year prior to the events. By comparison, the negative and significant coefficients on $Treat\times Current$, $Treat\times After1$, and $Treat\times After2+$ support that plausibly exogenous increases in share pledging due to the regulatory change lead to a significant decrease in corporate default risk.

3.4. Robust Checks

In this section, we make a series of robust checks to verify our DiD estimations. Table 7 reports the results. In Column (1), we delete observations of 2008-2009 to eliminate the effect of financial crisis. The result documents that the coefficient of $Treat\times Post$ is still negative and significant at the 5% level. In Column (2), we add other control variables that may also affect the likelihood of default in to our specifications. We still find that share pledging has a significantly negative effect on corporate default risk. In our main DiD specifications, based on $\Delta Pledge_{-1\ to\ +1}$, we sort the sample firms into deciles and regard the top three deciles of the distribution representing the firms experiencing the largest

increase in share pledging. In this section, we use the median of $\Delta Pledge_{-1\ to\ +1}$ to sort the sample and regard the top 50% of the distribution representing the firms experience larger increase in share pledging (treatment firms). Then we use the PSM strategy to find control firms for the treatment firms. Lastly, we estimate the DiD specification in this new PSM sample. Column (3) present the results, which indicates a significantly negative relation between share pledging and corporate default risk. In Column (4), we use other proxies for corporate default risk and re-estimate our DiD specification. Prior literature suggests that firms' distress risk is correlated with the likelihood of default. Firms face high default risk also have high distress risk, and vice versa [10, 21]. For example, Zhang et al. [24] found that Altman's Z-score variables accounted for about half of the estimated variation in default probabilities in Chinese firms [1]. Therefore, in Column (4), we use the Z-score as a proxy for corporate default risk and make DiD regression. Since higher Z-score represents lower distress risk, we find a significantly positive relation between share pledging and Z-score, indicating share pledging decreases firms' possibilities of distress. In sum, our robust checks confirm that share pledging reduces corporate default risk significantly.

Table 6. *DiD analysis of the effect of pledge shares on default risk.*

	EDF	EDF
	(1)	(2)
Treat×Post	-0.0092**	
	(-1.9678)	
Treat×Before1		-0.0004
		(-0.0550)
Treat×Current		-0.0108**
		(-2.4061)
Treat×After1		-0.0089*
		(-1.7775)
Treat×After2+		-0.0081*
		(-1.7727)
Controls	Y	Y
_cons	0.0384	0.0371
	(0.6161)	(0.5995)
Year FE	Y	Y
Firm FE	Y	Y
N	6294	6294
adj. R²	0.0595	0.0591

Table 7. *DiD Robust checks.*

	(1)	(2)	(3)	(4)
	EDF 2010-2016	EDF Add controls	EDF New PSM	Z-score
Treat×Post	-0.0104**	-0.0093**	-0.0076*	0.6226**
	(-2.0499)	(-2.0374)	(-1.7926)	(2.0391)
Controls	Y	Y	Y	Y
PPE		-0.0227**		
		(-2.3310)		
lnAsset		-0.0173		
		(-0.8247)		
SA		0.0245		
		(1.2500)		
Profit		-0.0000***		
		(-3.1946)		
Growth		0.0027		
		(1.2874)		

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8 As we control for year- and firm-fixed effects, variables $Treat_i$ and $Post_{i,t}$ will be absorbed during the estimation.

| | (1) | (2) | (3) | (4) |
	EDF 2010-2016	EDF Add controls	EDF New PSM	Z-score
_cons	-0.0240	0.4551	0.0259	15.0063
	(-0.3469)	(1.2401)	(0.4530)	(1.0237)
Year FE	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
N	5168	6289	6745	6278
adj. R²	0.0458	0.0641	0.0570	0.6112

4. Cross-sectional Tests

In this section, we examine whether the tendency of avoiding downward price pressures and the strength of external monitoring, measured by ownership concentration and institutional ownership respectively, can affect the relationship between share pledging and corporate default risk.

First, when controlling shareholders have larger stakes in the firm, they will have strong incentives to prevent margin calls [5]. In a margin call, if borrowers do not deposit more funds or repay the loan, the lenders could sell the pledged shares. When the amount of shares sold is high, controlling shareholders probably lose their control of the firm. Thus controlling shareholders would avoid margin call in a variety of ways. In our setting, we predict that controlling shareholders, especially when they have larger stakes in the firm, have stronger incentives to lower firms' likelihood of default to avoid margin call.

To test this assumption, we divide our sample into two subgroups with higher and lower ownership concentration with the sample median of ownership by the largest shareholder in each year. We estimate our DiD specification in the two sub-samples and report the results in Table 8 Column

(1) and Column (2). It is documented that the negative effect of share pledging is significant at the 5% level in the higher ownership concentration sample, however, the effect is not significant in the lower ownership concentration sample. The results indicate that controlling shareholders have great motivations to reduce corporate default risk to avoid downward price pressures from margin calls.

Second, creditors often require collateral in loan contracts to mitigate information asymmetry between the borrowers and lenders [2]. Therefore, collateral serves as an insurance to against firms' unfavorable conditions, such as default. Consequently, creditors will improve their incentives to monitor to insure their rights in the firm [19]. In our setting, the pledged shares also serve as collateral in loan contracts for firms, thus when management create a pledge on shareholdings for bank loans, the agency costs of outside investors can increase. In this situation, we predict that share pledging will facilitate creditors' external monitoring to the firm and decrease the likelihood of default, and the effect will be more pronounced in firms with ex-ante weaker external monitoring [4].

Institutional investors are active to the governance practice of listed firms, thus serve as an effective external monitoring mechanism. To examine the above prediction, we split the sample according to the sample median of institutional ownership in each year. Then we investigate the effect of share pledging on corporate default risk in each sub-sample. Table 8 Column (3) and Column (4) report the results. We find that the effect of decreased share pledging on default risk is more pronounced for firms with less ex-ante external monitoring (below-median institutional ownership), suggesting that share pledging enables creditors to monitor the share borrower and prevent default.

Table 8. Cross-sectional tests.

Variables	(1) High Concentrate	(2) Low Concentrate	(3) High Instown	(4) Low Instown
Treat×Post	-0.0164**	-0.0029	-0.0058	-0.0227**
	(-2.0583)	(-0.5198)	(-1.3183)	(-2.2135)
Controls	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
N	3147	3147	4415	2353
adj. R²	0.0681	0.0451	0.0449	0.0877

5. Conclusion

In this paper, we examine the effect of share pledging on corporate default risk. We find that share pledging reduces default risk through an IV analysis and a DiD analysis. Our results are consistent in several of robust checks. For example, our baseline results are robust by eliminating the effect of financial crises, adding other control variables, constructing new PSM samples and use other proxies for default risk. The further examination shows that the effect of share pledging is more pronounced in firms with higher ownership concentration and lower ex-ante external monitoring. In general, our results indicate that share

pledging can be beneficial to shareholders and important stakeholders like creditors by reducing the likelihood of corporate default.

Our paper throws additional light on the economic impact of share pledging. Although several studies argue that share pledging incentivizes corporate insiders to use corporate resources for private benefits and destroy firm value on the Taiwanese stock market, our findings indicate that share pledging facilitates external monitoring and enables creditors to protect themselves. Our results indicate that as strong government intervention during market downturns may limit A-share listed firms' exposure to downside risk associated, share pledging can play a more positive role in our setting.

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Biography

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