Stock Pledged Loans, Capital Markets, and Firm Performance: the Good, the Bad and the Ugly*

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Abstract

Stock pledged loans—loans with shareholders' stock as collateral—is prevalent among Chinese listed firms. At the end of 2016, the largest shareholder of a listed firm pledges a greater fraction of her stock holdings in exchange for credit when the firm is in a growth industry, more financially constrained, less profitable and not majority owned by the government. The performance of firms with high levels of stock pledged loans is not significantly different from those with low levels of stock pledged loans in 2017. During the bear market of 2018, highly pledged firms face greater stock crash risk due in part to "forced sales" of pledged stock, have worse stock returns and higher likelihood of default, and worse operating performance. There is also a "contagion" effect from the selling of one high-pledged stock to another. Using a policy shock in 2013 that allowed securities companies to provide stock pledged loans to listed firms, we find that obtaining these loans relaxed firms' financial constraints and improved firm performance during 2013-2014. However, this lending channel imposes substantial risk on the firms during stock market downturns, and concentrated selling of pledged stock can impose systemic risk on the market.

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I. INTRODUCTION

The Chinese domestic, "A share" stock market, with more than 3,400 firms listed in the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE), was the second largest in the world as measured by the total market capitalization at the end of 2017, behind only the U.S. equity markets. It was also one of the worst performing markets globally in 2018, falling 26% from end-of-2017 level. A number of factors contributed to the bear market of 2018, including worsening economic conditions in China and escalating US-China trade frictions. In this paper, we document another factor contributing to the downturn in the market: the prevalent use of stock pledged loans by large shareholders of listed firms and the amplifying effects of the "forced sales" of the pledged stocks during a market downturn.

According to WIND (based on firm disclosure), the leading data vendor of listed firms in the Chinese stock market, more than 95% of the 3,434 listed firms have at least one shareholder uses stock as collateral in exchange for credit at the end of 2018. The total number of pledged stocks is 63.45 billion shares, with the total value of the pledged stocks reaching RMB 4.23 trillion, or 10% of the total market cap. More than 95% of the stock pledged loans are taken by the largest shareholder of the firms, and these pledged stocks and loans, as well as their corresponding shareholder/borrower are the focus of the study.

While almost all firms have stock pledged loans, the distributions on the ratios of pledge stocks over both the total shares outstanding of the firms and the holdings of the largest shareholder are heavily skewed to the right (Figure 1). For example, while the median of stock pledged ratios of listed companies increased from 7.6% (at the beginning of 2017) to 11.6% (at the end of 2018), a firm with a very high ratio of pledged stock—the 90th percentile of the distribution—increased from 36.1% to 41.4%. The fraction of stockholdings pledged by the

largest shareholder has increased at much faster paces, especially for those highly pledged firms: for example, the pledge ratio of the 75th percentile of the distribution increased from 46.2% to 68.8%, and the 90th percentile increased from 84.5% to 97.8%. By the end of 2018, there are nearly 500 firms with their largest shareholder pledging more than 90% of their holdings.

As of the end of 2016, the largest shareholder of a listed firm pledges a greater fraction of her stock holdings in exchange for credit when the listed firm is in a growth industry, more financially constrained, less profitable and not majority owned by the government. Stocks of listed firm, especially those with high valuation, have become a popular choice (over other assets such as real estate, PP&E, etc.) for collateral in exchange for loans in recent years, especially for individual investors including the largest shareholders of listed firms. However, stock prices are sensitive to the operations of the firms as well as the economic and market environment; hence, the value of a stock as collateral can fluctuate more than other types of collateralizable assets, and impose greater risk on the firms, especially during periods of heightened market volatilities.

When the stock price drops below the "forced-sales" level, the lender will ask the borrower/shareholders to increase margins (by, e.g., pledging even more stocks) or force the sale of stocks in order to cover their own losses. When a forced sale of the pledged stock occurs, it may lead to a downward spiral and eventually a systemic crisis in the market. The selling of the stock has a negative impact on the stock price, which is difficult to rebound during a market downturn; when investors realize more "forced-sales" of pledged stocks might be coming, they will accelerate the selling of *other* stocks with high pledged ratios, in order to get out of the market before the next forced sale (and a large, discrete price drop), leading to large drops in the prices of the other stocks; the fall in the prices will then trigger more forced sales of stocks with high pledged ratios and then stocks with moderate pledge ratios, and even more investor panic

and 'fire sales,' and so on.

During this downward spiral, lenders such as commercial banks and securities companies will also have large losses regardless of whether they can force the sales of pledged stocks—as long as they use mark-to-market accounting, lenders will incur losses on their books if stock prices fall below the 'forced sale' level even if no sales occur. If stock pledged loans account for a large portion of all the loans of the lending institutions, they can end up in a crisis of their own, and this crisis can spread to the real sectors, like what we observe in the 2008-2009 global financial crisis.[1]

In order to test the above hypothesis of the impact of stock pledged loans, and in particular, the effects of forced sales of pledge stocks in a bear market, we conduct empirical analyses for the period 2017-2018. The year 2017 was a "normal" period for stocks as compared to 2018, and so we include this year in our tests as benchmark, in order to shed light on the adverse effects of forced sales of pledged stocks. To alleviate potential endogeneity problem on the largest shareholder's choice of a particular level of pledge ratio, we use the stock pledged ratio of the largest shareholder at the end of 2016—prior to the beginning of our testing period—in all the analyses.

We obtain three sets of results. First, firms with high levels of stock pledged loans (by their largest shareholder) have worse stock returns in the bear market of 2018. We sort stocks into six groups based on the stock pledged ratio of the largest shareholder at the end of 2016. The stock returns of firms with high levels of stock pledged loans in 2017 are not significantly different from those of firms with low levels of stock pledged loans. However, in 2018, firms with high stock pledged ratios underperformed other groups of firms: the cumulative return of

[1] According to the pre-announcement of their annual reports of 2018, three securities companies, Pacific Securities, Industrial Securities, Founder Securities announced that the impairment losses of assets are up to RMB 971 million, 651 million, and 470 million, respectively, and the losses are mainly driven by stock pledge lending business.

the high-pledged stock portfolio is –44.20%, which is 15.84% lower than the return of the no-pledge portfolio and 13.22% lower than the return of the low-pledged stock portfolio. We obtain similar results in multivariate regressions: high-pledged stocks underperform other stocks by 0.8% per month (or 9.6% per annum), after controlling for industry and firm characteristics and time effects. We also find that firms with high levels of stock pledged loans face greater crash risk as measured by the negative skewness of the distributions of stock returns and the number of days (within a quarter) during which large drops in stock prices are observed. In a stable market period (year 2017), crash risks are not related to the level of stock pledged ratio. During 2018, however, crash risk is highly correlated with the level of stock pledged ratio. In addition, while most firms' operating performance worsened in 2018 (drop in cash holdings and ROA and increase in leverage), firms with high levels of pledge stocks experienced greater deterioration.

Second, firms with high levels of stock pledged loans have stronger short-term stock momentum as compared to those with low levels of stock pledged loans. In multivariate regression of *daily* stock returns on momentum measures, we find momentum effects are present for stocks in 2018, but these effects exist only after a short-term *downward* trend—that is, stocks are more likely to fall following negative returns over the previous three trading days, but no significant pattern is detected after positive returns over the same prior trading period. Moreover, the negative momentum effects for stocks with high pledged ratios are much stronger than that for stocks with low levels of pledged ratios, consistent with the hypothesis that forced-sales of high-pledged stocks put more downward pressure on these stocks in a market downturn.

Third, there is a "contagion" effect from the selling of one high-pledged stock to another. We establish this conclusion by examining the *cross*-momentum effects of the "first-tier" high-pledged stocks on the *other* stocks: the portfolio of "first-tier" high-pledged stocks consist of

stocks with the pledged ratio of the largest shareholder greater than 95%. The results showed that, a negative return of the portfolio with the highest pledge ratios leads to negative returns of other highly pledged stocks—the portfolio of the "second-tier" high-pledged stocks (stocks with pledged ratio of the largest shareholder greater than 80% and less than or equal to 95%). In fact, the negative, cross-momentum effects of the "first-tier" high-pledged stocks on the other stocks outweigh the momentum effects of the other stocks themselves. By contrast, the negative momentum of the most highly pledged stocks has almost no impact on firms with no pledged stocks. When we run the same tests in 2017, we find that the impact of the negative momentum of the most highly pledged stocks on other highly pledged stocks is much weaker. Overall, these results provide evidence of the contagion effects of forced-sales of high-pledge stocks on others during a market downturn.

In 2013, the stock exchanges and regulators (CSRC) announced a policy reform that allowed securities companies (as pledgees) to provide stock pledged loans to listed firms (in stock exchange). This led to an increase in the provision of stock pledged loans as securities firms were not involved in this form of lending prior to the reform. This announcement led to a positive market reaction, especially for those financially constrained firms and those with more growth options. Using a propensity-score matching procedure and difference-in-difference tests, we find that obtaining these loans relaxed treatment firms' financial constraints and improved performance (ROA), as compared to control firms, during the period of 2011-2014. However, as we discussed above, this lending channel imposes substantial risk on the firms during stock market downturns, and concentrated selling of pledged stock can impose systemic risk on the market.

Our tests and results contribute to the literature on stock market crises by documenting

the role of stock pledged loans and forced sales of pledged stocks during market downturns. Stocks with high pledged ratios face greater crash risk and lower returns, due in part to forced sales of pledged stock by the creditors, and have higher likelihood of bond defaults during the bear market of 2018. There is also a contagion effect from the selling of one high-pledged stock to other stocks, which can lead to a market-wide crisis. Our results also extend the literature on credit constraints and firm performance, in that we document a new and more efficient lending channel—stock pledged loans provided by securities companies—can help alleviate credit constraints and lead to better performance, but this form of lending can also impose greater risks on firms, especially when the level of stock pledged loans is high and when the market hits downturns.

In Section II of the paper we review related literature, introduce our data sets and study the background of Chinese stock pledge market. We conduct empirical tests to examine the influence of stock pledge on firms' performance in capital market in Section III. Section IV includes the robustness check and other results. Section V concludes. The Appendix contains explanations of the variables used in the paper.

II. Literature Review And Data

Our approach and results extend several strands of literature by studying the relationship between stock pledged loans, capital market, and firm performances. The first strand of literature examines the economic consequences of stock pledge by the largest shareholders, mainly from the perspectives of agency problems, corporate behaviors and operating performance. The stock pledge decision made by the largest shareholders may aggravate the principal-agent problem between the controlling shareholders and outside shareholders. In a market with sustained

downtrend, controlling shareholders tend to occupy the resources of the company to maintain the stock price, under the pressure of 'forced-sales'. The behavior of the controlling shareholders will lead to the deviation of control rights from cash-flow rights, and enhance the leverage effects of control rights. Yeh et al. (2003) conclude that high levels of stock pledged loans lead to severer conflicts between controlling shareholders and outside shareholders, while good corporate governance and balance mechanism of shareholding can alleviate the problem. Based on the data of stock pledge in Taiwan from 1998 to 2003, Chen and Kao (2007) point out that ignoring the agency cost that is brought by stock pledge of controlling shareholders would damage the interests of creditors and minority shareholders.

Since controlling shareholders are sensitive to the value of pledged stocks, change in stock price could significantly affect the company's decisions especially for high-pledged firms (Chan et al., 2013). One possible corporate decision is to improve operating performance by manipulating earnings. Another possible cooperate decision is to boost the company's share price through stock repurchase. Chan et al. (2013) document that high-pledged firms are more likely to repurchase, especially after a significant drop in share prices.

In most cases, literatures conclude that there is a negative correlation between stock pledge and corporate operating performance. Chen et al. (2007) conclude that the stock pledge of the controlling shareholders would increase their risk preference, and transfer the high personal leverage to the listed company, therefore prompt the company to invest in projects with high risk and lead to excessive investment. Chiou and Kao (2002) point out that the stock pledge decreased the financial credibility and increased the risk of financial distress of the company. By studying stock pledge of insiders in Taiwan market, Dou, Masulis, and Zein (2019) find a negative impact of pledging on firm value. They focus on two channels through which pledging

can reduce shareholder wealth. One channel is that, margin calls triggered by price falls can increase the downside risk of a company with pledged stock. The other channel is that, pledging might increase risk aversion of managers, reflected in a lower CAPEX and R&D expenditures.

The second strand of literature studies co-movement and contagions of stock prices. Most literatures study stock co-movement using cross-country samples. Morck et al. (2000) argue that greater individual stock price variation as a proportion of total variation (low R^2) means more specific information content in price behavior and more efficient markets. They argue that the extent to which stocks move together depends on the relative importance of firm-level and market-level information capitalized into stock prices. Jin and Myers (2006), Hutton et al. (2009) document that poor corporate governance and opaqueness can explain the high synchronicity of stock returns in emerging markets including China. They argue that opaque firms (using earnings management as the measure) are more likely to experience stock price crashes.

Other literatures focus on the explanations of contagions during the period of crisis. Allen and Carletti (2006) argue that in time of financial crisis, mark-to-market accounting can lead to contagions where none would occur with historic cost accounting. They show that a shock in the insurance sector can cause the insolvency of the bank by using mark-to-market accounting, while banks are allowed to continue if historic cost accounting is used. Bian et al. (2018), using account-level trading data of a large sample of margin accounts, document direct evidences for deleveraging-induced fire sales during the crash. In another paper, Bian et al. (2018) further explore the contagion effect of this deleverage-induced fire-sale through the network of margin investors. Gan (2007), by studying the land market collapse in Japan, examines how a shock to collateral value leads banks to cut lending and forced sales of assets, which provides ideas for our study of “forced-sales” in stock market.

Our study differs from earlier studies in a number of ways. Firstly, previous literatures focused on the impact of stock pledge on corporate behavior and performance, and then indirectly analyzed its impact on stock price. However, stock pledge weakens the correlation between corporate performance and capital market (Chiou et al., 2002). Our paper contributes to the literature of stock pledge by studying the direct influence of stock pledge on stock performance in the perspective of "force-sales". Secondly, in most cases, literatures conclude that there is a negative correlation between stock pledge and corporate operating performance, but we argue that stock pledged loans can also help alleviate credit constraints and lead to better performance when the level of stock pledged loans is moderate. Thirdly, our paper provides a new explanation of co-movement and contagions of stock prices: dramatic falls of stock price out of 'forced-sales' trigger declines of firms in the same or related industries, and then lead to 'forced-sales' of other high-pledged stocks, with investor panic as the accelerator.

II.1. Data Source and Sample Construction

The data in this research included the listed companies of the Shanghai Exchange and Shenzhen Exchange (A-share market) from 2017 to 2018. We collect information related to stock pledged, bond default, and financial development indicators from WIND, which is the electronic data bank corporation providing the financial information of Chinese listed companies. We also extract returns, financial variables, ownership structure and corporate governance variables from CSMAR. In order to alleviate endogeneity problem on the largest shareholder's choice of a particular pledge ratio, we use stock pledged ratio of the largest shareholder at the

end of 2016 in all analysis and tests[2]. We exclude those companies that had not become listed prior to 2017 and those in the financial sector due to their unique operational and financial characteristics. In addition, we exclude those firms with special treatment such as ST and *ST, and those firms with book value of equity less than zero. In the end, the final sample includes 2898 unique firms. All continuous variables are winsorized at top and bottom 1% to reduce the impacts of outliers. The Appendix contains definitions of the variables used in the paper.

II.2. Background of Chinese Stock Pledge Market and "Forced Sales" of Pledged Stocks

There are two markets for stock pledged loans in China: the OTC market, and the exchange market. In the OTC market, the lenders can be securities companies, commercial banks, trusts, general firms and individuals. Loan agreements are more flexible with fewer restrictions, and the transactions are conducted over the counter. In the exchange market, the contract on stock pledged loans are standardized, with restrictions on maturity, underlying stocks, and other aspects. The lenders have to be securities companies, and the transactions are conducted in Shanghai and Shenzhen Stock Exchange, with higher efficiency compared to the OTC market.

In 1993, Corporation Law was passed in China. However, there are no clear provisions on stock pledge in China's Corporation Law. Only until 1995, China promulgated and implemented Guarantee Law, which officially established the stock pledge system in China. Since then, stock pledge becomes an important financing channel for shareholders. Before 2013, commercial banks and trust accounted for more than 90% of the market share in China. However, on May 24th, 2013, a new regulation on the approval of stock pledged repo transactions was issued by Shanghai Exchange, Shenzhen Exchange and China Securities Depository and

[2] At the end of 2016, the overall level of stock pledge of the largest shareholders is moderate and the market is comparatively stable. Therefore, the stock pledged ratio is less likely affected by the forced-sale pressure, and basically reflects the financing demand of the largest shareholders.

Clearing Corporation, which start the exchange market of stock pledged loans (only securities companies can be the lender in the exchange market of stock pledge). Since then, the market share of securities companies in stock pledge market has increased progressively, and becomes the largest lender in the stock pledge market. Compared to the cumbersome and time-consuming procedures of bank loans, stock pledge is convenient without too much risk of losing the control the firm (in a bull or stable market). In this case, stock pledge becomes one of the most favorite sources of financing in China.

The final implementation of "forced-sales" of pledged stocks is influenced by the contents of the stock pledge contract, including aspects like calculation method of collaterals' value, amount of stock pledged loans, and "forced-sales" level. Financial conditions of shareholders and administrative intervention from regulators are other factors that might affect the "forced-sales" of the pledged stock. In this case, it is difficult to verify the exact time and scales of the "forced-sales".

However, to some extent, the stock pledged ratio of the largest shareholder could be a proxy for "forced-sales" risks. When the stock price drops below the "forced-sales" level, the lender will ask the borrower/shareholders to increase margins or force the sale of stocks in order to cover their own losses. In practice, shareholders, especially the largest shareholders, tend to provide more margins even sometimes they have to borrow money in OTC market with higher loan rates. For them, raising stock pledged ratio is a clear negative signal in a bear market: the shareholders encounter financing constraints and are not able to increase the margin. In this case, shareholders with high levels of stock pledged loans tend to be faced with financial constraints, and hence a high risk of "forced-sales" in a downtrend market. Examining stock momentum of firms with stock pledged loans can provide us with more understandings in the economic results

of "forced-sales" of pledged stocks.

III. EMPIRICAL RESULTS

III.1. Descriptive Statistics

Table 1 reports firm characteristics in 2017 for stock pledge portfolios. At the end of 2016, we pick out those firms with no shares pledged of the largest shareholders to form non-pledged portfolio[3]. For the rest firms, we sort them into five equal groups based on stock pledged ratio of the largest shareholders. In this case, we have six stock pledge portfolios in total: non-pledged portfolio, and low-pledged to high-pledged portfolios (five equal portfolios). While non-pledged stocks account for more than 60% of all listed firms, the average stock pledged ratio of high-pledged portfolio is up to 97.8%. High-pledged firms are likely to be financial constrained and poor in operating performance: high-pledged firms have lower level of cash holdings and lower ROA compared to other firms. Remarkably higher leverage for high-pledged firms suggests that the financial conditions of listed firms and their largest shareholders are highly correlated. In addition, the ownership structures of firms vary across stock pledge portfolios: more than 50% of the firms in non-pledged portfolio are SOEs, but there are only 2% SOEs in high-pledged portfolio, as the largest shareholders of SOEs are less financial constrained.

We remain the stock pledge portfolios unchanged, and calculate buy-and-hold returns (BHRs) by accumulating equal-weighted monthly portfolio returns. Figure 2 shows the equal-weighted BHRs of the stock pledge portfolios from Jan. 2017 to Dec. 2018. The market experiences a sustained downtrend across the whole sample period, with more dramatic decline in 2018. As compared to 2018, the year 2017 is a "normal" period for stocks, with no significant

[3] At the end of 2016, more than half of the listed companies' largest shareholders didn't pledge any stocks. Therefore, we need to consider the situation of non-pledged stocks separately.

differences across stock pledge portfolios. The cumulative return of the high-pledged portfolio in 2017 is -15.9%, which is 3.4% lower than non-pledged portfolio and 2.0% lower than low-pledged portfolio. In 2018, high-pledged portfolio underperforms other portfolios significantly: the cumulative return of high-pledged portfolio in 2018 is -44.20%, which is 15.84% lower than non-pledged portfolio and 13.22% lower than low-pledged portfolio. We can't rule out the reason that high-pledged firms are those firms with relatively small market capitalizations which underperform the market in 2018, but it is more likely due to the "forced-sales" of pledged stocks.

III.2. Monthly Stock Returns of Firms with Stock Pledged Loans

Table2 presents OLS estimates of firm-level monthly returns for 2017-2018 sample periods. *Pledged Ratio* is the percentage of the largest shareholder's ownership that is pledged at the end of 2016. *High Pledge* is an indicator taking the value of one if *Pledged Ratio* is larger than 80%. To distinguish the situation of "normal" period (year 2017) from "abnormal" period (year 2018), we add *Dum2017*, which is an indicator taking the value of one if the firm-month observation is in 2017, in the regression. In Columns 1 and 2, we only include the measures of stock pledge level (*Pledged Ratio* and *High Pledge*) as well as their interactions with *Dum2017*.

The negative coefficients on *Pledged Ratio* and *High Pledge* indicator show that firms with high levels of stock pledged loans have remarkably lower returns than those firms with low levels of stock pledged loans in a bear market of 2018. On average, high-pledged firms underperform others by 1.5% per month (or 18.0% per annum), after controlling for industry and time effects (Columns 2, significant at the 1% level). Also, we find negative coefficient of cross term *Pledged Ratio*Dum2017* (Column 1, significant at the 1% level), with magnitude similar to

the coefficient of *Pledged Ratio*. The situation is similar in Column 2 for the coefficient of cross term *High Pledge*Dum2017*. The results suggest that stock performances of high-pledged firms are not significantly different from other stocks in a "normal" period of 2017, which are consistent with figure 2.

When firm-controls are included, we continue to find positive coefficients of *Pledged Ratio* and *High Pledge*, and negative coefficients of cross terms *Pledged Ratio*Dum2017* and *High Pledge*Dum2017* (results are statistically significant across Columns 3 to 6 with alternative controls). On average, during the "abnormal" period of 2018, the monthly returns of high-pledged firms are 0.8% (or 9.6% per annum) lower than other companies, with firm characteristics, industry effects and time effects controlled.

Coefficients on firm-controls show as expected. The negative coefficients of *Prior Ret* (cumulative returns of prior three months) and positive coefficients on B/M suggest that higher cumulative returns in the prior three months, and lower book-to-market ratio, are associated with lower stock returns of firms in the next month. The reason behind could be that over-valuation will lead to the future reversion of stock price, and vice versa. Significantly positive coefficients on *LEV*, indicate that firms with higher leverage are likely to face greater risk of bankruptcy, and hence higher risk premium. The estimated coefficients of ROA are significantly positive, meaning that, on average, more profitable firms generate higher stock returns. *Institutional Ownership* takes positive coefficient, suggesting that institutional investors with supervising roles improve firms' corporate governance, and therefore improve stock performances of stocks.

Overall, these results suggest the stock returns of firms with high levels of stock pledged loans in 2017 are not significantly different from those of firms with low levels of stock pledged loans. However, in 2018, firms with high stock pledged ratios underperformed other firms.

III.3. Stock Crash Risk of Firms with Stock Pledged Loans

We follow Hutton et al. (2009) and Kim et al. (2011) papers to construct crash risk measures. First, we calculate the firm-specific daily return $W_{i,t}$ which is equal to $\ln(1 + residual)$, where the residual is $\varepsilon_{i,t}$ from the expanded index-model regression:

$$r_{i,t} = a_i + b_1 * r_{m,t-2} + b_2 * r_{m,t-1} + b_3 * r_{m,t} + b_4 * r_{m,t+1} + b_5 * r_{m,t+2} + \varepsilon_{i,t}$$

where $r_{i,t}$ is the return on stock i in date t, $r_{m,t}$ is the return of Shanghai Stock Exchange in date t. And then, based on firm-specific daily return $W_{i,t}$, we construct crash risk measures as following:

(1) *DUVOL*

$$DUVOL_{i,m} = \frac{(n_u - 1)\sum_{DOWN} W_{i,t}^2}{(n_d - 1)\sum_{UP} W_{i,t}^2} \quad (1)$$

where, $n_u(n_d)$ is number of days when firm-specific daily return $W_{i,t}$ is higher (lower) than the mean of firm-specific daily return of the quarter. Higher value of *DUVOL*, indicates higher level of left-skewed distributions, and hence higher crash risk.

(2) *Crash Freq*

Crash Freq is the number of days within a quarter when a firm's firm-specific daily return falls 1.645 or more standard deviations below the mean of firm-specific daily returns for the last twelve months, with 1.645 chosen to generate a frequency of 5% in the normal distribution. Higher *Crash Freq* indicates higher crash risk.

Table 4 shows the OLS regression results of crash risk for 2017-2018 sample periods. We use *DUVOL* as dependent variable in Columns 1 to 3, and *Crash Freq* as dependent variable in Columns 4 to 6. In Columns 1 and 4, we only include *Pledged Ratio* and the cross term *Pledged Ratio*Dum2017* in the regression. The positive coefficients on *Pledged Ratio* (Columns 1 and 4,

both significant at the 1% level), indicate that high-pledged firms are more likely to crash and deliver large negative returns, in the bear market of 2018.

Furthermore, we find the coefficients of the cross term *Pledged Ratio* Dum2017* negative, with magnitude similar (Column 1) or even much higher (Column 4) than the coefficient of *Pledged Ratio*. The results indicate that, in the "normal" period of 2017, crash risks are unrelated to or even negative correlated with the level of stock pledged loans. The reason behind could be that, for firms with high levels of stock pledged loans, their main stakeholders (including the largest shareholders and executives, etc.) have pressures and incentives to reduce companies' stock crash risks. However, shareholders and companies are likely to manipulate earnings or announce "enjoyable" news of firms to control crash risks rather than improve performance of their companies (Xie, 2017). By this argument, with lower crash risks in a "normal" period, firms with high levels of stock pledged loans might face even higher crash risks in a bear market since the performance of the company are not truly improved.

We continue to find positive coefficients of *Pledged Ratio*, when firm-controls are included (Columns 2 to 3, Columns 5 to 6, all significant at 1% level). The results suggest that high-pledged firms are likely to face greater crash risk in 2018, even with firm characteristics, industry effects and time effects controlled. Coefficients of firm-controls show as expected. Overheated stocks with lower book-to-market ratio and higher prior three month BHRs are likely to have higher frequency of crash in the next quarter (Columns 5 to 6, all significant at 1% level). Negative coefficients of *Cash* and *ROA* indicate that lower cash holdings and profitability are associated with higher probability of crash in the next quarter.

To summarize, in a stable market period such as 2017, crash risks are not related to the level of stock pledged loans, while during a bear market such as 2018, crash risk is highly

correlated with the level of stock pledged loans.

III.3. Stock Momentum of Firms with Stock Pledged Loans

According to the public information, the Shanghai Composite Index reached a new high of 3,587 (a new high since 2016) on Jan 29th, 2018. Since then, the market has been in a sustained downtrend without much upside movement, with frequent occurrences of "forced-sales". In this case, we select the daily returns of stocks listed in A-share market as the sample with period covering whole year of 2018 (Table 4, Panel A), to examine the momentum of firms in bear markets, especially the momentum of high-pledged firms. To compare the situation of bear market with a "normal" market, we also examine the momentum of firms in 2017 (Table 4, Panel B).

Table 4 presents the results of multivariate regressions of firm-level daily returns. Panel A reports the regression results of a downtrend market of year 2018. *Mom* is accumulative returns of individual stocks in the prior three trading days. *Neg Mom* is an indicator taking the value of one if *Mom* is negative. *MKT* is accumulative returns of Shanghai Composite Index in the prior three trading days. In all specifications we control for the market return (*MKT*). In Column 1, we only include *Mom* and *MKT* in the regressions, while in Column 2, we add the cross term *Mom*High Pledge*. As indicated in Columns 1 and 2, we find the positive coefficients on *Mom* and *Mom*High Pledge* (both significant at 1% level), with market return controlled. The magnitude of coefficient of *Mom*High Pledge* are even larger than that of *Mom*. These results suggest that momentum effects exist for stocks in 2018, and momentum effects for stocks with high level of stock pledged loans are much stronger than that for stocks with low levels of stock pledged loans.

In Column 3, we include cross terms *Mom*Neg Mom* and *Mom*Neg Mom*High Pledge* in the regression, in order to examine whether momentums exist in certain directions. We find positive coefficients on *Mom*Neg Mom* and *Mom*Neg Mom*High Pledge* (Column 3, both statistically significant at the 1% level), while the coefficients of *Mom* and *Mom*High Pledge* become insignificant. These results suggest that momentum effects exist only after a short-term downward trend—that is, stocks are more likely to fall following negative returns over the previous three trading days, but no significant pattern is detected after positive returns over the same prior trading period. Moreover, the negative momentum effects for high-pledged stocks are much stronger than that for low-pledged stocks, consistent with the hypothesis that "forced-sales" of high-pledged stocks put more downward pressures on these stocks in a market downturn.

In Columns 4 and 5, when we include firm characteristics as controls in the regressions, the results remain consistent with Column 3. We continue to find positive coefficients on *Mom*Neg Mom* and *Mom*Neg Mom*High Pledge* (Column 4 and 5, both statistically significant at the 1% level). Based on the result in Column 5, on average, a 1% falling in stock price in the prior three trading days is associated with a 0.030% continuous falling in the following day for all firms, while it is associated with a 0.064% continuous falling in the following day for high-pledged firms, after controlling for market returns, firm characteristics, industry effects and time effects.

The coefficients of firm-controls show similar results compared to those in Table 2 (OLS estimates of monthly returns). Higher book-to-market ratio is associated with higher stock returns of firms. Firms with higher levels of cash loadings outperform those firms with low levels of cash loadings. More profitable firms generate higher stock returns. Also, as indicated in Column 5, all the corporate governance variables (*Independent Directors*, *Institutional*

Ownership, *Largest-holder Ownership*) take positive coefficient, suggesting that better corporate governance leads to higher stock returns.

Panel B reports the regression results on the existence of momentum effects of firms in a "normal" year of 2017. In all specifications, the coefficients of *Mom* are positive and significant at 1% level, indicating that short-term momentum effects also exist for stocks in 2017. However, the cross terms *Mom* High Pledge*, *Mom*Neg Mom* and *Mom*Neg Mom*High Pledge,* are all insignificant, suggesting that there's no evidence that momentum effects for stocks with high-pledged stocks are stronger than that of low-pledged stocks.

To conclude, while momentum is widespread for all stocks in a bear market such as 2018, "forced-sales" of high-pledged stocks put more downward pressure on these stocks. However, in a "normal" year such as 2017, there are no large differences of the momentum effects between high-pledged stocks and others.

III.4. Contagion (Cross-momentum) Effects of Firms with Stock Pledged Loans

Another interesting question is whether there exist "contagion" effects of "forced-sales". When investors realize that "forced-sales" of pledged stocks might be coming in the near future, they will accelerate the selling of other stocks with high pledged ratios (in order to get out of the market before the next forced sale by lenders and discrete price drop), leading to large drops in prices of other stocks: fall in stock prices will trigger more "forced sales" of stocks with high pledged ratios, and then stocks with moderate stock pledge ratios, and further investor panic and fire sales. Examining the cross-momentum effects of firms with stock pledged loans enable us to verify "contagion" effects of "forced-sales". Similar to the tests on momentum effects, we also examine the cross momentum effects of firms in a bear market of 2018 and in a "normal" market

of 2017, respectively.

We define those firms with stock pledged ratio of the largest shareholders greater than 95% as “first-tier” high-pledged firms, and define those firms with stock pledged ratio of the largest shareholders greater than 80% and less than or equal to 95% as “second-tier” high-pledged firms. At the end of 2016, a total of 183 “first-tier” high-pledged firms account for 5.5% of listed companies, while 283 “second-tier” high-pledged firms account for 8.5% of listed companies. Then we construct an equal-weighed portfolio of “first-tier” high-pledged stocks at the end of 2016 and remain the portfolio unchanged.

Table 5, examines the cross-momentum effects of “first-tier” high-pledged stocks on others. The sample of multivariate regressions exclude “first-tier” high-pledged firms. Panel A reports the results of a bear market of 2018. *CrMom* is accumulative returns of “first-tier” high-pledged portfolio in the prior three trading days. *Neg CrMom* is a dummy variable taking one if *CrMom* is negative. In all specifications we control for the market return (*MKT*), and individual stocks’ momentum (*Momentum*). In Column 1, we include *CrMom*, *Mom*, and *MKT* in the regressions. While the coefficient on *Mom* and *CrMom* are both positive, the significance and magnitude of the coefficient on *Mom* is much lower than that of *Cross Momentum*, which indicates that there exist cross-momentum effects of “first-tier” high-pledged portfolio on other stocks with market returns controlled, and the cross-momentum effects of the “first-tier” high-pledged firms on other stocks outweigh the momentums of other stocks themselves.

In Column 2 and 3, we include *CrMom***High Pledge* and *CrMom***Zero Pledge* in the regression, respectively. The coefficient on *CrMom* and *CrMom***High Pledge* are both positive and significant at 1% confidence level (Column 2), suggesting that there exist cross-momentum effects of “first-tier” high-pledged portfolio on other stocks, and these effects are stronger on

"second-tier" high-pledged firms, which provides empirical evidence of "contagion" effects of "forced-sales". The coefficient on *CroMom*Non Pledge* shows no significance (Column 3), indicating that there's no evidence showing that "first-tier" high-pledged portfolio have stronger cross-momentum effects on non-pledged stocks.

After including cross terms *CrMom*Neg Mom* and *CrMom*Neg CrMom*High Pledge* in the regressions (Column 4), we find coefficients of *CrMom*, *CrMom*Neg Mom* and *CrMom*Neg CrMom* High Pledge* all positive and significant. The economic meaning behind the coefficients is that, the cross-momentum effects on "second-tier" high-pledged firms are stronger than on other stocks, but only under the condition that "first-tier" high-pledged portfolio is in a short-term downtrend. With firm characteristics and individual stock's momentum controlled, the regression coefficients of *CrMom* and cross item *CrMom*Neg CrMom*High Pledge* remain its significance, while the coefficients of *Mom* are insignificant (Column 5 and Column 6).

Panel B reports the regression results in a "normal" year of 2017. The positive coefficients of *Cross Mom* suggest that there exist cross-momentum effects of "first-tier" high-pledged stocks on others. However, the insignificant coefficients of *CrMom*Neg Mom* and *CrMom*Neg CrMom* High Pledge* indicating that "first-tier" high-pledged portfolio doesn't have stronger cross-momentum effects on "second-tier" high-pledged firms.

To summarize, the test provides evidence of the "contagion" effects of "forced-sales" of high-pledged stocks on others during a market downturn.

IV. ROBUSTNESS CHECK AND OTHER RESULTS

Endogenous problems for stock pledged ratio exist in the multivariate regressions of monthly returns and crash risk measures. In table 2 and table 3, we carefully used the stock

pledged ratio of the largest shareholder at the end of 2016 in all analysis and tests. In further tests, we try to figure out the determinants of stock pledged ratio, and select appropriate instrumental variable for it.

IV.1. Determinants of Stock Pledged Ratio of the Largest Shareholder

First, financing constraint of the shareholder and the company[4] is one of the most important determinants of stock pledged ratio. With high extent of financing constraints, the largest shareholders have an incentive to pledge their stocks for financing. Fazzari, Hubbard and Petersen (1988) propose dividend payout ratio as a proxy for financing constraints. High dividend payout ratio indicates abundant internal capital with low cost. Vogt (1994), Athey and Laumas (1994) use different indicators to measure the company size, and the results conclude that small firms are severely constrained by financing compared to large firms. The age of the firm, the proportion of fixed assets, the short-term and long-term solvency can also affect the firm's financing constraints.

Second, a developed financial market provides diversified channels for listed companies and their shareholders to obtain funds (Greenwood and Jovanovic, 1990; Claessens and Laeven, 2003), and hence low demand for stock pledged loans of the largest shareholder. We use two variables, *Securities* and *Financial Sector Weight*, to measure the level of regional financial development. *Securities* is the number of business departments of securities companies in a given province divided by the area of the province, and *Financial Sector Weight* is financial sector added value of a given province divided by GDP of the province.

Third, the attribute of the largest shareholders and ultimate controllers can also influence

[4] Financing constraint of the largest shareholders is closely linked to the financing constraint of the company. If the company can easily obtain funds from its daily operation or financial institutes, the financing constraints of its largest shareholders' can be relieved in ways of cash dividends, borrowing, related party transactions etc..

the level of stock pledged loans. Stated-owned companies, with guarantees of their parent firms even state guarantees, can easily borrow money from banks or other financial institutions, and therefore lower demand for stock pledged loans. However, if the largest shareholder is a natural person, there might be a high demand for stock pledged loans for reasons such as improving the quality of life.

For a large portion of listed firms at the end of 2016, the stock pledged ratios of the largest shareholders take the value of one or zero (60% of listed firms' largest shareholders pledge no shares, and 2% of listed firms' largest shareholders pledge all their shares). In this case, we use the Tobit model for the regressions of stock pledged ratios. Table 6 reports the Tobit regression results on the determinants of stock pledged ratio at the end of 2016, with independent variables from fiscal year 2015.

Coefficients of independent variables show as expected. Negative coefficients of *Cash* and positive coefficients of *Leverage* indicate that firms with lower cash loadings and higher leverage are likely to encounter financial constraints and hence have higher levels of stock pledged loans. Negative coefficients on B/M suggest that shareholders are willing to pledge stocks with high valuation for more loans. *SOE* takes negative coefficient, suggesting that the largest shareholders of state-owned companies are less likely to use stocks as collaterals. In contrast, *Natural Person* takes positive coefficient, showing that natural persons, as the largest shareholder, are more likely to pledge their shares. We also find the coefficients on *Securities* and *Financial Sector Weight* negative. The reason behind could be that in regions with low level of financial development, the largest shareholders are likely to have limited channels for financing, and hence tend to use stock pledged loans to alleviate financing constraints.

Figure 3 shows market shares of different types of lenders in stock pledge market (2010

to 2018). For each year, the market share is calculated as the shares pledged to a certain type of lender divided by the total shares pledged within the year. The types of lenders in stock pledge market include: securities companies, commercial banks, trusts, general firms and individuals. Since the stock pledged repo transactions are officially approved in 2013 (only securities companies can be the lenders in stock pledged repo transactions), the market share of securities companies in stock pledge market has increased progressively, and becomes the primary provider of stock pledge loans in recent years. In this case, we choose *Securities* as the instrumental variable (IV) for stock pledged ratio of largest shareholder. Our choice of the IV is valid as it proxies the accessibility of securities companies for the provision of stock pledged loans for the largest shareholders of listed firms (as of the end of 2015), and it should not directly affect the performance of the firms during 2017 and 2018. Next we use two-stage, IV regressions (with *Pledged Ratio* instrumented by *Securities*) to examine the effects of high-pledged stocks,.

IV.2. Two-Stage, IV Regressions on the Effects of High-Pledged Stocks

Table 7 presents two-Stage, IV regressions on the effects of high-pledged stocks, with *Pledged Ratio* instrumented by *Securities*. Panel A reports the results of first stage regression on *Pledged Ratio*. Since for a large portion of listed firms, the largest shareholders pledge no shares or all of their shares. In this case, we use Tobit model for the regressions of stock pledged ratios in the first stage, with independent variables measured at fiscal year-end of 2015. Then we take the predicted value of *Pledged Ratio* (from first stage) into the second stage regressions of monthly returns (Columns 1 to 3), and measures of crash risks (Columns 4 to 9).

Panel B reports the second stage OLS regression results on the effects of stocks with high pledge ratios. Columns 1 to 3 present second stage OLS regression results of monthly returns. As

indicated in Columns 1 to 3, we continue to find coefficients on *Pledged Ratio* significantly negative. Even though the magnitude of negative coefficients on *Pledged Ratio* is lower than those in Table 2 (OLS estimates), the main results remain consistent. That is, firms with high levels of stock pledged loans have worse stock returns than those firms with low levels of stock pledged loans in the bear market of 2018. Similar to the results in Table 2, positive coefficients of *Pledged Ratio* Dum2017* suggest that stock performances of high-pledged firms are not significantly different from other stocks in a "normal" period of 2017. Signs and magnitudes of the coefficients on firm-controls are similar as compared to those in Table 2. The results suggest that higher cumulative returns in the prior three months, and lower book-to-market ratio, are associated with lower stock returns of firms in the next month; firms with higher leverage outperform others; more profitable firms generate higher stock returns; and corporate governance can improve stock performances of stocks.

Columns 4 to 9 show second stage OLS regression results of measures of crash risks (*DUVOL*, *Crash Freq*) on the level of stock pledged loans. In Columns 4 to 9, *Pledged Ratio* continue to take positive coefficients, indicating that firms with high levels of stock pledged loans face greater stock crash risk. Coefficients of control variables show as expected. Lower book-to-market ratio is associated with higher frequency of crash and greater chance of large negative returns. Lower cash holdings and profitability leads to higher probability of crash in the next quarter.

To conclude, results from the two-stage regressions remain qualitatively consistent as compared to OLS estimates (in Table 2 and Table 3).

IV.3. Bond Defaults of Firms with Stock Pledged Loans

In the second half of 2018, with credit risks continuing to increase, a wave of bond defaults attracted wide attention in the market. With the implementation of new asset management regulations, non-standard credit assets continued to shrink, bonds with low credit rating are difficult to issue. As a result, the shareholders of listed companies turned to use stock pledge loans for financing, which increases the credit risk of the shareholders and also indirectly reduces the repayment ability of listed companies.

From 2014, when "Chaori Solar" (first Chinese firm ever to default on its onshore corporate bond) defaulted on its bonds, to the end of 2018, a total of 62 bond defaults of listed companies occurred. However, 57 default events of them occur in 2018. In this case, we select the sample of non-SOE firms in 2018 (default events occurred only on non-SOE firms), to examine the correlation between stock pledged loans and bond default events. We considered multiple defaults of the same listed companies on same day as one single event, resulting in a sample of 39 default events in 2018. *Default* is an indicator taking one if the firm defaults on its bond in the given quarter, and zero otherwise.

Table 8 reports the Probit regression results of bond default on stock pledged ratio of the largest shareholder. In Column 1, the positive coefficient on *Pledged Ratio* (significant at 1% confidence level), indicates that bond default probability for firms with high levels of pledged loans is higher than those with low levels of stock pledged loans. In Column 2 to 4, coefficients on *Pledged Ratio* remain positive (significant at 10% confidence level) with firm characteristics controlled. According to WIND, when these default events occurred, the average stock pledged ratio of the largest shareholders was 92.5%, which provides similar results as in Table 8.

The sign of other variables are also as expected. The negative coefficients of *Cash* show that lower level of cash holdings is associated with higher probability of bond default in next

quarter. Significantly positive coefficients on *LEV*, indicate that firms with high leverage are likely to default on their bonds. The estimated coefficients of ROA are significantly negative, meaning that less profitable firms tend to default. All the corporate governance variables (*Independent Directors*, *Institutional Ownership*, *Largest-holder Ownership*) take negative coefficient, suggesting that poor corporate governance leads to bond defaults.

IV.4. Stock Pledged Loans Act as a "Double-edged Sword" on Firms' Performances

In most cases, literatures conclude that there is a negative impact of pledging on firms' corporate operating performance (Chen et al., 2017; Chiou and Kao, 2002; Dou, Masulis, and Zein, 2019). However, low cost and convenience of stock pledged loans provide shareholders of listed companies with an important source of financing. By relaxing the financial constraints of shareholders, stock pledged loans create a better financial environment for those firms, especially for non-SOEs with high level of financial constraints.

Figure 4 plots the number of shares pledged to different types of lenders, and Figure 5 plots the number of shares pledged in exchange market and OTC market. According to Figure 4 and Figure 5, we can divide the development of China's stock pledged loans market into three time periods: before 2013, 2013 to 2016, 2017 to 2018.

In the first period (before 2013), commercial banks and trust accounted for more than 90% of the market share, while securities companies rarely participated in this market. Moreover, by the end of 2012, the number of listed firms with the largest shareholders pledging their shares is as low as five, suggesting that shareholders of listed companies didn't pay much attention to the market of stock pledged loans. Overall speaking, the development of stock pledged loans market before 2013 was relatively slow.

According to Figure 4 and Figure 5, from 2013 to 2016, the number of shares pledged increases dramatically. There are several reasons behind the rapid development of stock pledged loans market. Firstly, on May 24th, 2013, a new regulation on the approval of the exchange market of stock pledged loans, was issued by Shanghai Exchange, Shenzhen Exchange and China Securities Depository and Clearing Corporation. Since then, the securities companies become one of the largest lenders in the market (only securities companies can act as the lenders in stock pledged repo transactions). Even though the total number of shares pledged didn't increase much from 2012 to 2013, quite a large number of shareholders became willing to use stock pledged loans as financing sources. To be specific, the number of the largest shareholders of listed companies with their shares pledged increased from 5 to 349 in year 2013, and the turning point is the month new regulation issued (Figure 6). Secondly, since 2013 (to 2016), China entered the cycle of rate cuts, providing lower costs of stock pledged loans. Thirdly, bull market before July, 2015 and the restrictions of share reductions after July, 2015, are also important factors contributing to the development of stock pledged loans market.

The third period is 2017 to 2018. In this period, stock pledged loans of listed firms have reached a high level. Hundreds of firms have their largest shareholders pledging over 95% of their shares. The regulators also realized the potential risks of stock pledged loans, and therefore introduced regulations to restrict the stock pledged loans market[5]. In this case, the number of shares pledged (within the year) decreases dramatically from 2017 to 2018.

Based on the analysis above, we can examine the relations between stock pledged loans and firm performance by the following ways: (1) based on the policy shock of stock pledged loans, we can examine whether the decision that (the largest shareholders) starting to pledge their

[5] On Mar 12th, 2018, a regulation on the restrictions of stock pledged repo transactions was implemented. On May 30th, a new restriction of securities companies participating in OTC market was issued.

loans help improving firms' performance; (2) since high-pledged firms encounter larger stock price declines due to "forced-sales" during the bear market of 2018, we can examine whether firms' performances are also affected.

IV.4.1. Policy Shock of Stock Pledged Loans in 2013

Taking May 24th, 2013 as the event day, table 9 reports results of the regressions where the dependent variable is the CAR for each firm measured using the CAPM over the event window [-1,1]. We exclude those firms with the largest shareholders pledging their shares before 2013 (only five firms). The negative and significant coefficients on *Cash*, *Size*, *Age*, *PPET*, *B/M*, indicate that the shareholders of growth firms with high level of financial constraints (young age, small size, low level of cash and fixed asset), react positively to the new regulation. That means, the market believe that firms with strong financial constraints will benefit from the development of stock pledged loans market.

Table 10 reports the results of the regressions of the largest shareholders' decision on stock pledging. The dependent variable *Pledge* is the dummy variable taking the value of one if the largest shareholders start to pledge their shares during year 2013, and zero otherwise. We also exclude five firms with the largest shareholders pledging their shares before 2013. We continue to find negative coefficients on *Cash*, *Size*, *Age*, *PPET*, *B/M*, suggesting that those firms react positively to the new regulation, are likely to be those firms starting to pledge their shares.

Table 11 reports results of difference-in-difference analysis before and after the approval of stock pledged repo transactions. The sample period is 2011-2014. We define treatment firms as those firms with the largest shareholders start to pledge their shares during year 2013. Those firms with the largest shareholders pledging no shares during 2013 are potential control firms.

We select control firms from this subsample using the Propensity Score Matching procedure. In the first stage probit regression, the dependent variable *Treat* is a dummy variable taking the value of one if the largest shareholders start to pledge their shares during year 2013, and zero otherwise. We regress this indicator variable on factors mentioned in table 10, to obtain the propensity scores. Then we match each of the treatment firms to all control firms that (1) are in the same industry and (2) have propensity scores that differ from the treatment firm's propensity score by no more than 15%. For all specifications, we include treatment firms and their corresponding comparable firms only. *Post* equals one for observations in 2013 and 2014, and zero for observations in 2011 and 2012. For Columns 1-3, the dependent variables are ROA. For columns 4-6, the dependent variables are *Investment*, constructed following Chen, Novy-Marx and Zhang (2010).

In Columns 1, we only include *Treat*, *Post*, as well as the cross term *Treat*Post* in the regression. The positive coefficients on the cross term *Treat*Post* (Column 1, significant at 1% level) show that treatment firms, of which the largest shareholders start to use stock pledged loans as financing source, have higher extent of performance improvement compared to control firms. In Columns 2 and 3, we continue to find positive coefficients on *Treat*Post* (Columns 2 and 3, both significant at the 1% level), indicating that higher performance improvement of treatment firms remains after controlling firm characteristics. In Columns 4-6, the positive coefficients on the cross term *Treat*Post*, indicate that, with the largest shareholders pledging their shares, those firms are likely to have higher investment growth compared to control firms.

To conclude, for firms with high level of financial constraints, the largest shareholders are willing to pledge their shares for financing, and the stock price for those firms reacts positively to the new regulation. When the level of stock pledged loans is moderate, obtaining

these loans relaxed firms' financial constraints and improved performance (ROA), as compared to control firms, during the period of 2011-2014.

IV.4.2. Diff-in-Diff Analysis on Firms' Operating Performance (2017-2018)

Table 12 reports results of difference-in-difference analysis on firms' operating performance for year 2017 and 2018. We define treatment firms as those with the percentage of the largest shareholder's ownership that is larger than 80% at the end of 2016. Those firms with the largest shareholders pledging no shares at the end of 2016 are potential control firms. We select control firms from this subsample using the Propensity Score Matching procedure. In the first stage probit regression, the dependent variable *Treat* is a dummy variable taking the value of one if the percentage of the largest shareholder's ownership that is larger than 80% at the end of 2016, and zero otherwise. We regress this indicator variable on factors mentioned in table 10, to obtain the propensity scores. Then we match each of the treatment firms to all control firms that (1) are in the same industry and (2) have propensity scores that differ from the treatment firm's propensity score by no more than 15%. For all specifications, we include treatment firms and their corresponding comparable firms only. *Post* equals one for observations in 2018, and zero for observations in 2017. For Columns 1-2, the dependent variables are *ROA*. For columns 3-4, the dependent variables are *Cash*. For Columns 5-6, the dependent variables are *Lev*.

In Column 1, we only include *Treat*, *Post*, as well as the cross term *Treat*Post* in the regression. The negative coefficients *Treat*Post* (Column 1, significant at 1% level), indicate that ROA of high-pledged firms encounter a higher level of decline compared to non-pledged firms in 2018. Coefficients on *Treat*Post* remains negative (Column 2, significant at 1% level) with firm characteristics controlled. In Column 3 and 4, we find negative coefficients on

*Treat*Post*, suggesting that high-pledged firms are likely to have higher extent of decline in cash holdings during the bear market. In Column 5 and 6, the positive coefficients on *Treat*Post*, indicate that the leverage of high-pledged firms have a larger extent of increase compared to non-pledged firms.

To conclude, for high-pledged firms, "forced-sale" of pledged stocks will lead to dramatic decline of stock price during the bear market such as 2018. Meantime, high level of stock pledged loans, along with sustained stock price decline, could lead to the deterioration of operating performances and financial conditions, including profits, cash holdings, and leverages.

V. CONCLUSION

Stocks of listed firm, especially those with high valuation and liquidity, have become a popular choice for collateral in exchange for loans in recent years, especially for individual investors including the largest shareholders of listed firms. However, stock pledge, to some extent, is a "double-edged sword" for the large shareholders and firms. While stock pledged loans relax financial constraints of the largest shareholders, they impose substantial risk on the firms during stock market downturns, and concentrated selling of pledged stock can impose systemic risk on the market.

The year 2017 was a "normal" period for stocks as compared to 2018, and so we study the impact of stock pledged loans and their corresponding shareholders and firms for both 2017 and 2018, in order to shed light on the adverse effects of "forced sales" of pledged stocks. We find that firms with high levels of stock pledged loans have worse stock returns in the bear market of 2018. In addition, firms with high levels of stock pledged loans face greater stock crash risk, and had worse operating performance during 2018 (greater drop in ROA and cash

holdings and larger increase in leverage).

Second, firms with high levels of stock pledged loans have stronger short-term stock momentum as compared to those with low levels of stock pledged loans. In multivariate regression of *daily* stock returns on momentum measures, we find momentum effects are present for stocks in 2018, but these effects exist only after a short-term downward trend. Moreover, the negative momentum effects for stocks with high pledged loans are much stronger than that for stocks with low levels of pledged loans, consistent with the hypothesis that "forced-sales" of high-pledged stocks put more downward pressure on these stocks in a market downturn.

Third, there is a "contagion" effect from the selling of one high-pledged stock to another. We find that, a negative return of the portfolio with the highest pledge ratios leads to negative returns of other highly pledged stocks. By contrast, the negative momentum of the most highly pledge stocks has no impact on firms with no pledged stocks. When we run the same tests in 2017, we find that the impact of the negative momentum of the most highly pledged stocks on other highly pledged stocks is much weaker. Overall, these results provide evidence of the contagion effects of forced-sales of high-pledge stocks on others during a market downturn.

Using a policy shock in 2013 that allowed securities companies to provide stock pledged loans to listed firms, we find that obtaining these loans relaxed firms' financial constraints and improved firm performance during 2013-2014. However, this lending channel imposes substantial risk on the firms during stock market downturns, and concentrated selling of pledged stock can impose systemic risk on the market.

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Figure 1. Stock Pledged Ratios of the Company and the Largest Shareholder (2017-2018)

This figure plots the fraction of stocks pledged (for loans) of the listed firm and of the largest shareholder. Panel A plots the stock pledged ratio of the company at the end of each month from Jan. 2017 to Dec. 2018. Stock pledged ratio of the company is calculated as the total shares pledged divided by total shares listed in A Share market. Panel B plots the stock pledged ratio of the largest shareholder at the end of each month from Jan. 2017 to Dec. 2018. Stock pledged ratio of the largest shareholder is calculated as the percentage of the largest shareholder's ownership that is pledged. In Panel A and Panel B, we plots the median, 75th percentile, 90th percentile of stock pledged ratio of the company and the largest shareholder at the end of each month.

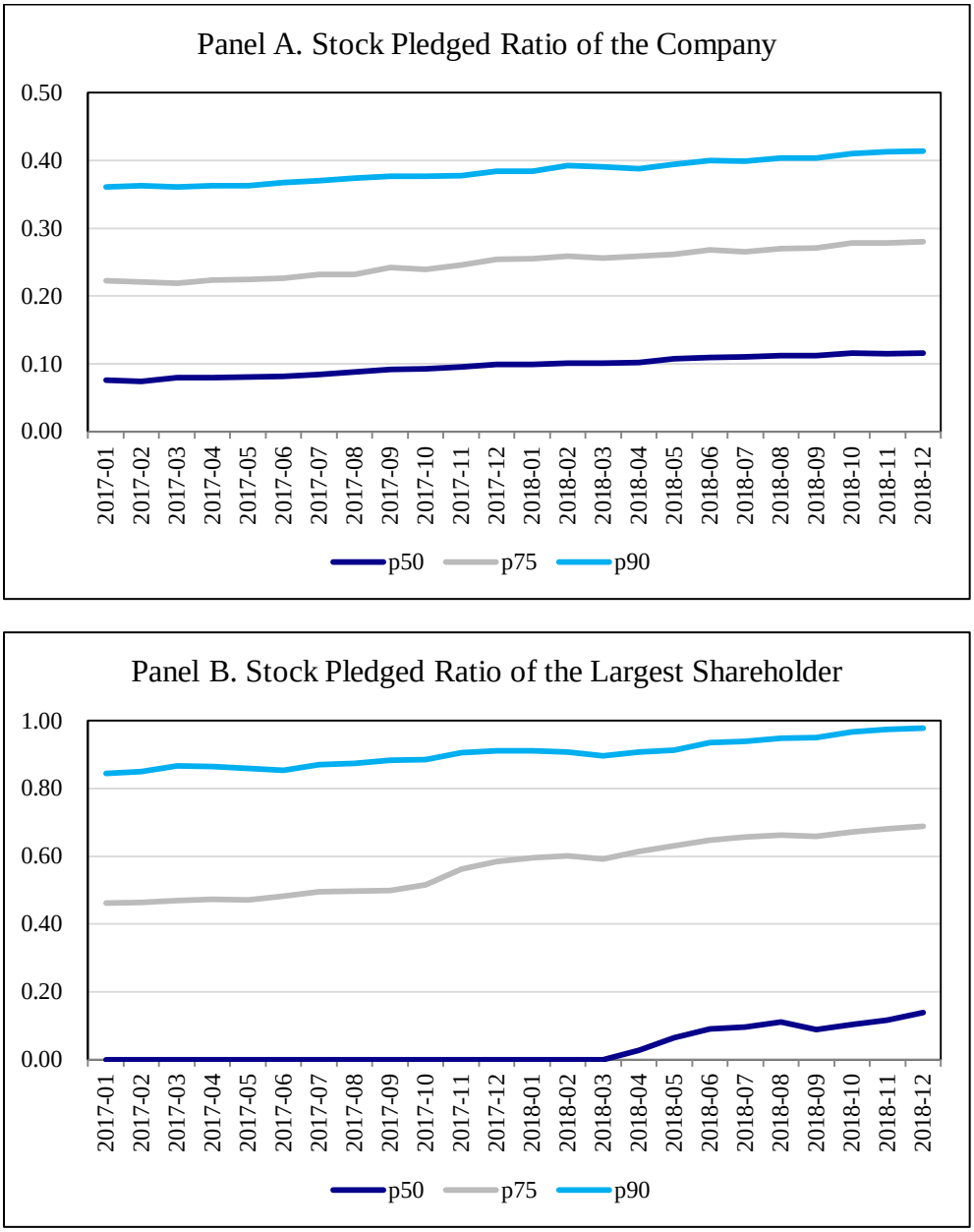

Figure 2. Cumulative Returns of Stock Pledge Portfolios (Jan.2017-Apr.2019)

This figure plots the equal-weighted buy-and-hold returns (BHRs) of the stock pledge portfolios from Jan. 2017 to Apr.2019. At the end of 2016, we form the "non-pledged" portfolio by choosing firms with no shares pledged by the largest shareholder; we sort the rest of the firms into five equal groups based on the stock pledged ratio of the largest shareholder. We have 6 portfolios in total: non-pledged, low-pledged to high-pledged portfolios (five equal portfolios). We keep the firms in each portfolio unchanged from Jan.2017 to Apr.2018, and the BHRs are calculated by accumulating equal-weighted monthly portfolio returns. The returns are adjusted for stock splits and include cash dividends.

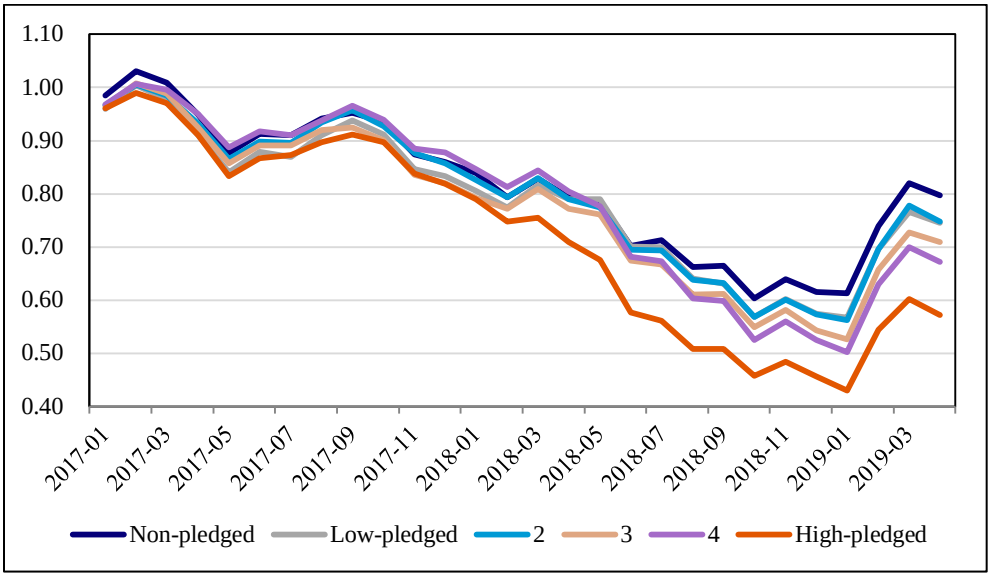

Figure 3. Shares of Different Types of Lenders in the Market for Stock Pledge Loans (2010-2018)

This figure plots the market shares of different types of lenders in the market for stock pledge loans from 2010 to 2018. For each year, the market share is calculated as the shares pledged to a certain type of lender dividend by the total shares pledged across all lenders in the year. The types of lenders in stock pledge market include: securities companies, commercial banks, trust companies, general (non-finance) firms and individuals.

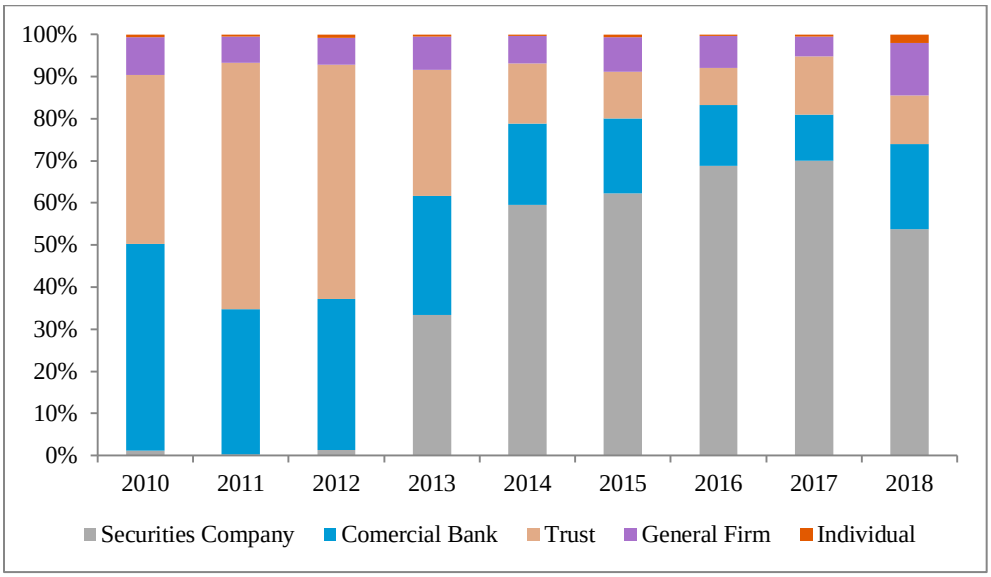

Figure 4. Number of Shares Pledged to Different Types of Lenders (2010-2018)

This figure plots the number of shares pledged to different types of lenders in stock pledge market each year from 2010 to 2018. The types of lenders in stock pledge market include: securities companies, commercial banks, trusts, general (non-finance) firms and individuals.

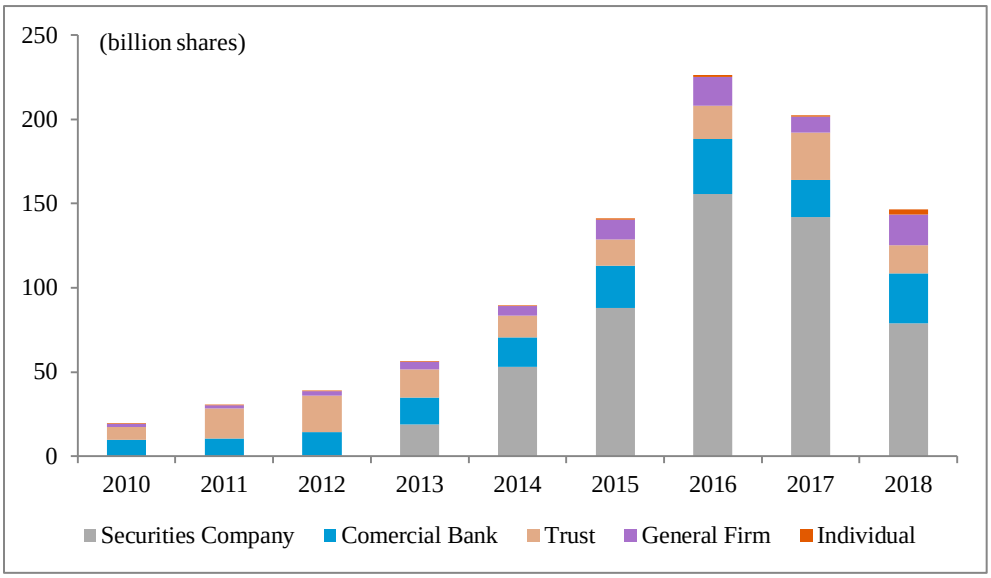

Figure 5. Number of Shares Pledged in Exchange and OTC Markets (2010-2018)

This figure plots the number of shares pledged in exchange and OTC market each year from 2010 to 2018. On May 24th, 2013, a new regulation on the approval of Stock Pledged Repo Transactions, was issued by Shanghai Exchange, Shenzhen Exchange and China Securities Depository and Clearing Corporation. Stock Pledged Repo Transactions are implemented in Shanghai and Shenzhen Exchange Transaction Systems between securities companies (lender) and pledgers.

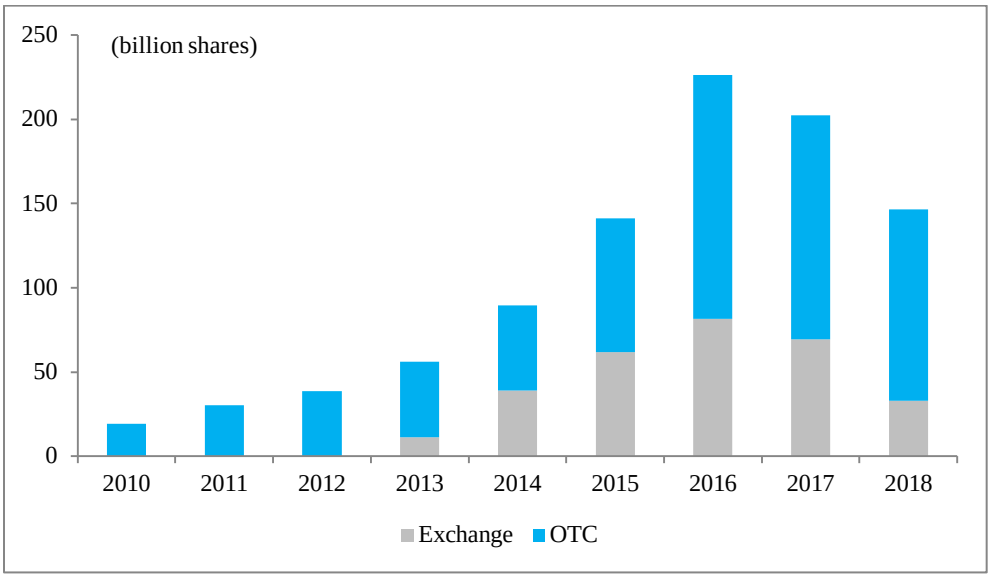

Figure 6. Number of the Largest Shareholders (of Listed Firms) with their Shares Pledged (2012.12.31-2013.12.31)

This figure plots the number of the largest shareholders (of listed firms) with their shares pledged on each month-end from Dec 31th, 2012 to Dec 31th, 2013.

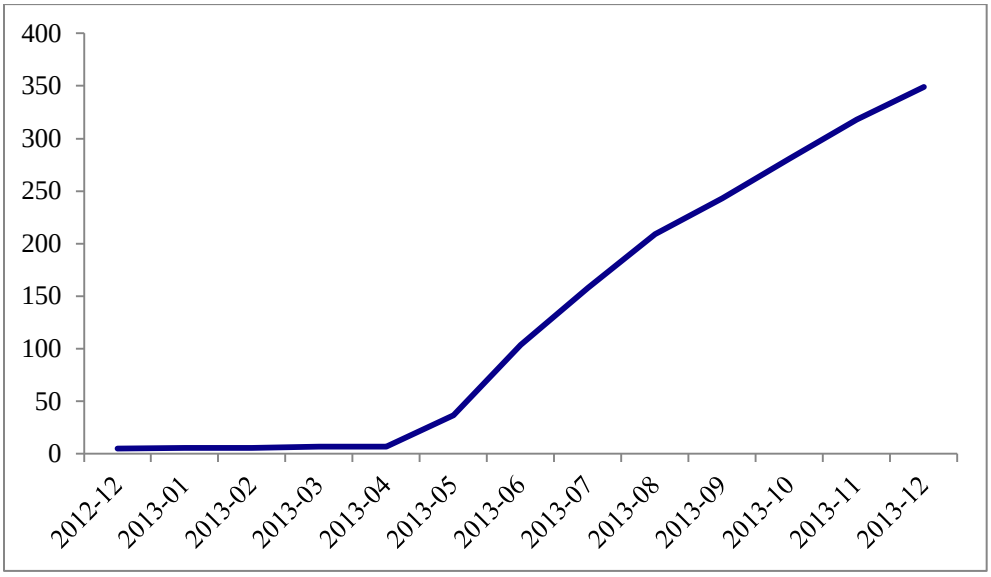

Table 1. Summary Statistics of Firms in Different Stock Pledge Portfolios

This table reports firm characteristics of 6 stock pledge portfolios. At the end of 2016, we choose firms with no shares pledged by the largest shareholder and construct the "Non-pledged" portfolio. For the rest of the firms, we sort them into 5 equal groups based on the stock pledged ratio of the largest shareholder at the end of 2016. We thus have 6 portfolios in total: non-pledged, low-pledged to high-pledged portfolios (five equal portfolios). Pledged Ratio is the percentage of the largest shareholder's stock holding that is pledged at the end of 2016. Cash denotes cash and cash equivalents/total assets. Institutional Ownership is the percentage of shareholdings by institutional investors. Largest-holder Ownership is the percentage of shareholdings by the largest shareholder. Independent Director is the ratio of the number of independent directors to board size. B/M is book assets/market capitalization of equity. Size is the natural logarithm of the market capitalization of equity. ROA is net income trailing twelve months/total assets. LEV is total liabilities/total assets. SOE is a dummy variable equals one if the firm is ultimately controlled by the central State-owned Assets Supervision and Administration Commission of the State Council (SASAC), local SASAC, Ministry of Finance, or other government agents, and zero otherwise. All firm characteristics are collected at the end of 2017, and reported as the portfolio mean. In addition, we examine the differences in means of firm characteristics between high- and low-pledged portfolios, and also high- and non-pledged portfolios. See detailed variable definitions in Appendix. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

			Firm Characteristics							
Stock Pledge Portfolios	Obs	Pledged Ratio	Cash	Institutional Ownership	Largest-holder Ownership	B/M	Size	ROA	LEV	SOE
Non-pledged	1693	0.000	0.179	0.422	0.350	0.445	15.943	0.043	0.428	0.503
Low-pledged	237	0.151	0.167	0.336	0.346	0.368	15.911	0.052	0.383	0.128
2	234	0.364	0.156	0.321	0.314	0.396	15.887	0.045	0.416	0.147
3	236	0.543	0.143	0.349	0.318	0.418	15.851	0.036	0.441	0.176
4	232	0.775	0.145	0.349	0.297	0.405	16.010	0.039	0.457	0.009
High-pledged	228	0.978	0.159	0.378	0.276	0.399	15.877	0.030	0.487	0.023
High-pledged - Low-pledged			-0.007	0.042**	-0.070***	0.031	-0.034	-0.022***	0.104***	-0.105***
			(-0.74)	(2.16)	(-5.74)	(1.45)	(-0.41)	(-4.48)	(5.63)	(-4.36)
High-pledged -Non-pledged			-0.020**	-0.044***	-0.074***	-0.046***	-0.066	-0.013***	0.059***	-0.481***
			(-2.40)	(-3.18)	(-8.34)	(-2.64)	(-1.07)	(-3.48)	(3.91)	(-30.10)

Table 2. Monthly Stock Returns of Firms with Stock Pledged Loans

This table presents OLS regression results for monthly returns of firms listed in A-share market on the stock pledged ratio of the largest shareholders. The sample period is 2017-2018. Pledged Ratio is the percentage of the largest shareholder's ownership that is pledged at the end of 2016. High Pledge is a dummy variable taking the value of 1 if Pledged Ratio is larger than 80%, and 0 otherwise. Prior Ret is the three-month buy-and-hold return ending on last month. Dum2017 is a dummy variable equals to 1 if the firm-month observation is in year 2017, and zero otherwise. SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of last quarter. See detailed variable definitions in Appendix. In all specifications we control for month and the industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by year-months and by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Variables	(1) Monthly Returns	(2) Monthly Returns	(3) Monthly Returns	(4) Monthly Returns	(5) Monthly Returns	(6) Monthly Returns
Pledged Ratio	-0.017***		-0.010***		-0.010***	
	(-4.11)		(-2.58)		(-2.69)	
Pledged Ratio*Dum2017	0.015***		0.009*		0.009*	
	(3.01)		(1.93)		(1.92)	
High Pledge		-0.015***		-0.007**		-0.008**
		(-4.52)		(-2.18)		(-2.39)
High Pledge*Dum2017		0.013***		0.007*		0.007*
		(3.37)		(1.81)		(1.83)
SOE			0.001	0.002	-0.001	0.000
			(0.40)	(0.72)	(-0.31)	(0.00)
Prior Ret			-0.021**	-0.021**	-0.021**	-0.021**
			(-2.23)	(-2.22)	(-2.23)	(-2.22)
Size			0.002	0.001	0.000	0.000
			(0.58)	(0.55)	(0.18)	(0.14)
B/M			0.022***	0.022***	0.021***	0.021***
			(3.20)	(3.17)	(3.18)	(3.15)
LEV			0.015***	0.014***	0.013***	0.013***
			(3.12)	(2.86)	(2.86)	(2.61)
Cash			0.003	0.004	0.002	0.003
			(0.49)	(0.60)	(0.27)	(0.38)
ROA			0.138***	0.139***	0.136***	0.138***
			(3.99)	(4.03)	(3.96)	(3.99)
Independent Director					0.006	0.006
					(1.02)	(1.07)
Institutional Ownership					0.013***	0.013***
					(3.00)	(3.09)
Largest-holder Ownership					0.001	0.001
					(0.25)	(0.32)
Constant	-0.050***	-0.053***	-0.102**	-0.102**	-0.091**	-0.091**
	(-11.47)	(-11.35)	(-2.24)	(-2.26)	(-2.08)	(-2.09)
Observations	65,821	65,821	60,289	60,289	59,831	59,831
R^2	0.19	0.19	0.21	0.21	0.21	0.21

Table 3. Stock Crash Risk of Firms with Stock Pledged Loans

This table presents the OLS regression results for crash risk on the stock pledged ratio of the largest shareholders. The sample period is 2017-2018. We construct two measures of crash risk based on firm-specific daily returns: DUVOL and Crash Freq. Firm-specific daily return is equal to ln (1+ residual), where the residual is $\varepsilon_{i,t}$ from the expanded index-model regression:

$$r_{i,t} = a_i + b_1 * r_{m,t-2} + b_2 * r_{m,t-1} + b_3 * r_{m,t} + b_4 * r_{m,t+1} + b_5 * r_{m,t+2} + \varepsilon_{i,t}$$

where $r_{i,t}$ is the return on stock i in date t, $r_{m,t}$ is the return of Shanghai Composite Index in date t. DUVOL is the variance of the firm-specific daily returns (of the quarter) whenever the firm-specific daily return is *lower* than the mean of firm-specific daily returns (of the quarter), divided by the variance of the firm-specific daily returns whenever the firm-specific daily return is *higher* than the mean of firm-specific daily returns. Crash Freq is the number of days within a quarter when a firm's firm-specific daily return falls 1.645 or more standard deviations below the mean of firm-specific daily returns for the last twelve months. Pledged Ratio is the percentage of the largest shareholder's ownership that is pledged at the end of 2016. High Pledge is a dummy variable taking one if Pledged Ratio is larger than 80%, and zero otherwise. Prior Ret is the three-month buy-and-hold return of last quarter. Dum2017 is a dummy variable taking one if the firm-month observation is in year 2017, and zero otherwise. SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of last quarter. See detailed variable definitions in Appendix. In all specifications we control for quarter and the industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by year-quarters and by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Variables	(1) DUVOL	(2) DUVOL	(3) DUVOL	(4) Crash Freq	(5) Crash Freq	(6) Crash Freq
Pledged Ratio	0.107***	0.051***	0.046***	0.504***	0.342***	0.310***
	(4.40)	(3.14)	(2.58)	(4.44)	(3.23)	(3.00)
Pledged Ratio*Dum2017	-0.085**	-0.041	-0.041	-0.830***	-0.614***	-0.593***
	(-2.56)	(-1.41)	(-1.40)	(-5.88)	(-4.77)	(-4.68)
SOE		-0.005	0.002		-0.016	-0.008
		(-0.23)	(0.08)		(-0.39)	(-0.19)
Prior Ret		-0.752***	-0.756***		1.698***	1.698***
		(-9.91)	(-9.91)		(7.13)	(7.05)
Size		0.066*	0.070**		0.101***	0.102***
		(1.82)	(2.03)		(2.77)	(2.71)
B/M		-0.134***	-0.137***		-0.763***	-0.772***
		(-3.06)	(-3.04)		(-7.42)	(-7.47)
LEV		-0.111***	-0.111***		-0.172	-0.157
		(-2.94)	(-2.82)		(-1.55)	(-1.41)
Cash		-0.079	-0.067		-0.279*	-0.263*
		(-1.30)	(-1.10)		(-1.82)	(-1.70)
ROA		-0.059	-0.046		-3.988***	-3.895***
		(-0.33)	(-0.25)		(-7.95)	(-7.75)
Independent Director			-0.001			0.314
			(-0.01)			(1.14)
Institutional Ownership			-0.005			0.039
			(-0.14)			(0.43)
Largest-holder Ownership			-0.138**			-0.287**
			(-2.41)			(-2.48)
Constant	1.052***	0.139	0.125	4.021***	3.257***	3.194***
	(30.77)	(0.24)	(0.23)	(20.85)	(5.68)	(5.35)
Observations	21,336	19,828	19,678	21,649	19,920	19,768
R^2	0.04	0.07	0.07	0.19	0.23	0.23

Table 4. Stock Momentum of Firms with Stock Pledged Loans

This table presents OLS regression results on the existence of momentum effects of firms with various levels of stock pledged loans. Panel A and B report results for sample period of year 2018 and year 2017 respectively. Daily Returns are adjusted for stock split and include cash dividends. High Pledge is a dummy variable taking one if the percentage of the largest shareholder's ownership that is pledged at the end of 2016 is larger than 80%, and zero otherwise. Mom is the three-day buy-and-hold return before date t. Neg Mom is a dummy variable taking one if Mom is negative, and zero otherwise. MKT is the three-day buy-and-hold return of Shanghai Composite Index before date t. SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of last quarter. See detailed variable definitions in Appendix. In all specifications we control for month and the industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by date and by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A: Sample period of year 2018

Variables	(1) Daily Returns	(2) Daily Returns	(3) Daily Returns	(4) Daily Returns	(5) Daily Returns
Mom	0.020***	0.017***	-0.004	-0.004	-0.004
	(8.07)	(6.30)	(-1.38)	(-1.38)	(-1.32)
Mom*High Pledge		0.031***	0.007	0.007	0.006
		(7.95)	(1.46)	(1.51)	(1.58)
Mom*Neg Mom			0.039***	0.034***	0.034***
			(7.28)	(6.31)	(6.23)
Mom*High Pledge*Neg Mom			0.039***	0.026***	0.028***
			(5.68)	(3.56)	(3.74)
MKT	0.369***	0.360***	0.360***	0.361***	0.360***
	(37.83)	(36.67)	(36.69)	(36.64)	(36.87)
SOE				0.000	0.000
				(1.37)	(0.42)
Size				-0.000***	-0.000***
				(-4.40)	(-5.05)
B/M				0.001***	0.001***
				(4.62)	(4.63)
LEV				0.000	0.000
				(0.59)	(0.36)
Cash				0.001***	0.001***
				(3.20)	(2.85)
ROA				0.006***	0.006***
				(5.66)	(5.67)
Independent Director					0.001**
					(2.52)
Institutional Ownership					0.000***
					(3.14)
Largest-holder Ownership					0.000*
					(1.84)
Constant	0.000	-0.000	0.001	0.004***	0.004***
	(0.34)	(-0.61)	(1.27)	(3.82)	(3.82)
Observations	801,443	658,809	658,663	623,468	617,415
R^2	0.27	0.28	0.28	0.28	0.28

Panel B: Sample period of year 2017

Variables	(1) Daily Returns	(2) Daily Returns	(3) Daily Returns	(4) Daily Returns	(5) Daily Returns
Mom	0.032***	0.013***	0.013***	0.011***	0.011***
	(10.14)	(5.21)	(3.55)	(3.19)	(3.29)
Mom*High Pledge		0.004	0.001	0.005	0.004
		(1.01)	(0.11)	(0.78)	(0.68)
Mom*Neg Mom			0.001	-0.004	-0.005
			(0.21)	(-0.88)	(-0.97)
Mom*High Pledge*Neg Mom			0.005	0.001	0.002
			(0.73)	(0.08)	(0.28)
MKT	0.463***	0.452***	0.452***	0.447***	0.447***
	(25.67)	(22.61)	(22.75)	(23.60)	(23.64)
SOE				0.000	-0.000
				(0.53)	(-0.35)
Size				0.000***	0.000***
				(6.96)	(6.19)
B/M				0.001***	0.001***
				(6.00)	(5.70)
LEV				0.001***	0.001***
				(4.99)	(4.70)
Cash				-0.001**	-0.001**
				(-2.16)	(-2.33)
ROA				0.007***	0.007***
				(8.31)	(8.27)
Independent Director					-0.000
					(-0.89)
Institutional Ownership					0.001***
					(3.40)
Largest-holder Ownership					-0.000
					(-1.64)
Constant	-0.002***	-0.002***	-0.002***	-0.009***	-0.009***
	(-6.20)	(-7.54)	(-7.04)	(-10.20)	(-9.51)
Observations	723,768	652,939	652,840	586,665	583,574
R^2	0.14	0.15	0.15	0.15	0.15

Table 5. Contagion (cross-momentum) Effects of Firms with Stock Pledged Loans

This table presents OLS regression results of cross momentum effects of firms with different levels of stock pledged loans. Panel A and B report results for sample period of year 2018 and year 2017 respectively. Daily Returns are adjusted for stock splits and include cash dividends. High Pledge is a dummy variable equals 1 if the stock pledged ratio of largest shareholder at the end of 2016 is greater than 80%. Zero Pledge is a dummy variable taking one if the largest shareholder of the firm didn't pledge any stocks at the end of 2016, and zero otherwise. We define those firms with stock pledged ratio of the largest shareholders greater than 95% as "first-tier" high-pledged firms (and we excludes those firms from the regression sample), and construct an equal-weighed portfolio of these firms at the end of 2016. For date t, we calculate the three-day buy-and-hold return of the portfolio before date t to obtain CrMom. Neg CrMom is a dummy variable taking one if CrMom is negative, and zero otherwise. (*Continued on next page*)

Panel A: Sample period of year 2018

Variables	(1) Daily Returns	(2) Daily Returns	(3) Daily Returns	(4) Daily Returns	(5) Daily Returns	(6) Daily Returns
CrMom	0.041***	0.040***	0.044***	0.028***	0.030***	0.030***
	(5.99)	(5.54)	(6.08)	(3.15)	(3.33)	(3.33)
CrMom* High Pledge		0.028***		0.006	0.012	0.012
		(3.55)		(0.64)	(1.20)	(1.23)
CrMom* Non Pledge			-0.002			
			(-0.62)			
CrMom* Neg CrMom				0.018*	0.021*	0.021*
				(1.73)	(1.93)	(1.93)
CrMom* High Pledge* Neg CrMom				0.030**	0.026**	0.026**
				(2.57)	(2.32)	(2.37)
Mom	0.004	0.004	0.001	0.004	-0.001	-0.001
	(1.60)	(1.60)	(0.47)	(1.59)	(-0.41)	(-0.35)
MKT	0.360***	0.360***	0.360***	0.360***	0.361***	0.360***
	(28.28)	(28.29)	(28.36)	(28.75)	(28.72)	(28.89)
SOE					0.000*	0.000
					(1.84)	(0.83)
Size					-0.000***	-0.000***
					(-3.66)	(-4.39)
B/M					0.001***	0.001***
					(5.89)	(5.92)
LEV					0.000	0.000
					(0.30)	(0.11)
Cash					0.001***	0.001***
					(3.58)	(3.23)
ROA					0.006***	0.006***
					(5.89)	(5.89)
Independent Director						0.001**
						(2.01)
Institutional Ownership						0.000***
						(3.02)
Largest-holder Ownership						0.001**
						(2.39)
Constant	-0.000	-0.000	0.000	0.000	0.003***	0.003***
	(-0.08)	(-0.07)	(0.16)	(0.34)	(2.71)	(2.80)
Observations	620,030	620,030	617,118	620,030	588,105	582,358
R2	0.28	0.28	0.29	0.28	0.29	0.29

Panel B: Sample period of year 2017

Variables	(1) Daily Returns	(2) Daily Returns	(3) Daily Returns	(4) Daily Returns	(5) Daily Returns	(6) Daily Returns
CrMom	0.013**	0.013**	0.013*	0.007	0.029**	0.029**
	(2.27)	(2.22)	(1.89)	(0.48)	(2.25)	(2.25)
CrMom* High Pledge		0.003		-0.004	-0.018	-0.020*
		(0.50)		(-0.38)	(-1.56)	(-1.70)
CrMom* Non Pledge			0.002			
			(0.52)			
CrMom* Neg CrMom				0.010	-0.007	-0.007
				(0.55)	(-0.39)	(-0.36)
CrMom* High Pledge* Neg CrMom				0.011	0.012	0.12
				(0.75)	(0.85)	(0.83)
Mom	0.005***	0.005***	0.004**	0.005***	-0.001	-0.001
	(2.71)	(2.72)	(2.30)	(2.72)	(-0.66)	(-0.59)
MKT	0.448***	0.448***	0.448***	0.449***	0.443***	0.443***
	(24.37)	(24.37)	(24.38)	(24.34)	(25.28)	(25.35)
SOE					0.000	-0.000
					(0.03)	(-0.77)
Size					0.000***	0.000***
					(7.87)	(7.16)
B/M					0.001***	0.001***
					(6.88)	(6.46)
LEV					0.001***	0.001***
					(5.11)	(4.81)
Cash					-0.000*	-0.001**
					(-1.88)	(-2.03)
ROA					0.008***	0.008***
					(8.57)	(8.60)
Independent Director						0.000
						(0.02)
Institutional Ownership						0.001***
						(3.76)
Largest-holder Ownership						-0.001***
						(-2.88)
Constant	-0.002***	-0.002***	-0.002***	-0.002***	-0.010***	-0.010***
	(-6.17)	(-6.17)	(-6.13)	(-5.83)	(-10.92)	(-10.34)
Observations	613,150	613,150	610,807	613,150	549,910	546,937
R2	0.16	0.16	0.16	0.16	0.16	0.16

(*Continued from last page*) Mom is the three-day buy-and-hold return before date t. MKT is the three-day buy-and-hold return of Shanghai Composite Index before date t. SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of last quarter. In all the specifications we control for month and the industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by date and by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6. Tobit Regression of the Determinants of Stock Pledged Ratio of the Largest Shareholder

This table reports the Tobit regression results on the determinants of stock pledged ratio. Pledged Ratio is the percentage of the largest shareholder's holdings that is pledged at the end of 2016. Age is the number of years since a firm's foundation to 2015. Current Ratio is the current assets divided by current liabilities at the end of 2015. PPET is the net book value of fixed assets divided by current liabilities at the end of 2015. Natural Person is a dummy variable equals 1 if firm is ultimately controlled by natural persons at the end of 2015, and 0 otherwise. Securities is the number of business departments of securities companies in a given province divided by the area of the province at the end of 2015. Financial Sector Weight is financial sector added value of a given province divided by GDP of the province in 2015. SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of 2015. In all specifications we control the industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Variables	(1) Pledged Ratio	(2) Pledged Ratio	(3) Pledged Ratio	(4) Pledged Ratio	(5) Pledged Ratio	(6) Pledged Ratio
Payout Ratio	-0.061	-0.059	-0.056	-0.040	-0.052	-0.036
	(-1.09)	(-1.23)	(-1.18)	(-0.85)	(-1.10)	(-0.77)
Cash	-0.634***	-0.339**	-0.353**	-0.388***	-0.295**	-0.333**
	(-3.80)	(-2.32)	(-2.42)	(-2.68)	(-2.02)	(-2.30)
Size	-0.027	-0.020	-0.008	-0.009	0.012	0.009
	(-1.10)	(-0.90)	(-0.38)	(-0.40)	(0.49)	(0.38)
Age	-0.009***	0.006**	0.006**	0.006**	0.005*	0.005*
	(-2.77)	(2.06)	(2.02)	(2.04)	(1.80)	(1.79)
LEV	0.298**	0.714***	0.700***	0.677***	0.595***	0.581***
	(2.58)	(6.86)	(6.75)	(6.59)	(5.46)	(5.38)
Current Ratio	-0.014	-0.012	-0.012	-0.012	-0.013	-0.013
	(-1.49)	(-1.50)	(-1.47)	(-1.51)	(-1.62)	(-1.64)
B/M	-0.853***	-0.185*	-0.205**	-0.223**	-0.236**	-0.254***
	(-7.94)	(-1.96)	(-2.17)	(-2.37)	(-2.50)	(-2.70)
PPET	-0.327**	-0.030	-0.093	-0.137	-0.111	-0.150
	(-2.41)	(-0.25)	(-0.77)	(-1.15)	(-0.92)	(-1.26)
SOE		-0.755***	-0.749***	-0.767***	-0.742***	-0.758***
		(-9.59)	(-9.56)	(-9.87)	(-9.50)	(-9.80)
Natural Person		0.224***	0.221***	0.224***	0.238***	0.242***
		(3.07)	(3.05)	(3.14)	(3.31)	(3.40)
Securities				-0.073***		-0.072***
				(-7.37)		(-7.37)
Financial Sector Weight			-1.802***		-1.794***	
			(-4.48)		(-4.50)	
ROA					-0.913***	-0.831***
					(-2.83)	(-2.61)
Independent Director					-0.138	-0.171
					(-0.51)	(-0.65)
Institutional Ownership					0.147*	0.155**
					(1.94)	(2.07)
Largest-holder Ownership					-0.212*	-0.228**
					(-1.87)	(-2.02)
Constant	1.047**	0.326	0.310	0.477	0.148	0.358
	(2.39)	(0.82)	(0.78)	(1.21)	(0.35)	(0.85)
Observations	2,087	2,051	2,051	2,051	2,051	2,051
Pseudo R^2	0.06	0.23	0.24	0.25	0.24	0.25

Table 7. Two-Stage, IV Regressions on the Effects of High Pledge Ratio Stocks

This table presents two-Stage, IV regressions on the effects of high pledge ratio stocks, with Pledged Ratio instrumented by Securities. Panel A reports the 1st stage Tobit regression on Pledged Ratio. Pledged Ratio is the percentage of the largest shareholder's holdings that is pledged at the end of 2016. Securities, SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of 2015. Panel B reports the 2nd stage OLS regression results on the effects of stocks with high pledge ratios, with Pledged Ratio instrumented by Securities. The sample period is 2017-2018. In columns (1)-(3), the dependent variables are monthly returns. In columns (4)-(6), the dependent variables are DUVOL. In columns (7)-(9), the dependent variables are Crash Freq. SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of last quarter. In column (1)-(3), we control for month and the industry fixed effects, while in column (4)-(9), we control for quarter and the industry fixed effects. t-values calculated using the standard errors clustered by year-months in column (1)-(3) (by quarter in column (4)-(9)) and by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A: First Stage Tobit Regressions on Pledged Ratio

Variables	(1) Pledged Ratio	(2) Pledged Ratio	(3) Pledged Ratio
Securities	-0.045***	-0.068***	-0.067***
	(-4.62)	(-7.08)	(-7.07)
SOE		-0.954***	-0.955***
		(-22.86)	(-22.48)
Size		0.009	0.005
		(0.37)	(0.20)
B/M		-0.254***	-0.266***
		(-2.85)	(-2.97)
LEV		0.683***	0.682***
		(7.87)	(7.87)
Cash		-0.317**	-0.316**
		(-2.36)	(-2.36)
ROA		-0.516*	-0.468
		(-1.66)	(-1.51)
Independent Director			0.078
			(0.30)
Institutional Ownership			0.137*
			(1.83)
Largest-holder Ownership			-0.237**
			(-2.14)
Constant	0.408***	0.408	0.478
	(3.35)	(1.07)	(1.21)
Observations	2,684	2,273	2,273
Pseudo R^2	0.04	0.23	0.23

Panel B: Second Stage OLS Regressions

Variables	(1) Monthly Returns	(2) Monthly Returns	(3) Monthly Returns	(4) DUVOL	(5) DUVOL	(6) DUVOL	(7) Crash Freq	(8) Crash Freq	(9) Crash Freq
Pledged Ratio	-0.010***	-0.006***	-0.005**	0.079***	0.042*	0.040*	0.486***	0.332***	0.310***
	(-5.62)	(-2.61)	(-2.25)	(3.64)	(1.94)	(1.82)	(4.35)	(3.37)	(3.20)
Pledged Ratio*Dum2017	0.005**	0.002	0.003	-0.046	-0.025	-0.026	-0.650***	-0.529***	-0.513***
	(2.17)	(1.05)	(1.17)	(-1.51)	(-0.82)	(-0.85)	(-4.73)	(-4.24)	(-4.16)
SOE		-0.001	-0.002		-0.010	-0.005		-0.033	-0.023
		(-0.42)	(-0.86)		(-0.77)	(-0.34)		(-0.76)	(-0.51)
Prior Ret		-0.019***	-0.019***		-0.741***	-0.745***		1.840***	1.840***
		(-4.24)	(-4.25)		(-22.46)	(-22.48)		(7.42)	(7.37)
Size		0.002**	0.001		0.060***	0.063***		0.083**	0.084**
		(2.11)	(0.98)		(8.17)	(8.00)		(2.30)	(2.27)
B/M		0.021***	0.021***		-0.133***	-0.135***		-0.706***	-0.714***
		(8.42)	(8.28)		(-5.67)	(-5.76)		(-6.76)	(-6.81)
LEV		0.013***	0.012***		-0.090***	-0.092***		-0.117	-0.111
		(3.90)	(3.42)		(-2.61)	(-2.67)		(-0.99)	(-0.93)
Cash		0.001	-0.000		-0.011	-0.005		-0.473***	-0.456***
		(0.27)	(-0.06)		(-0.20)	(-0.10)		(-2.74)	(-2.62)
ROA		0.140***	0.138***		-0.036	-0.030		-3.856***	-3.800***
		(8.61)	(8.55)		(-0.26)	(-0.22)		(-6.98)	(-6.88)
Independent Director			0.006			0.009			0.430
			(0.81)			(0.09)			(1.42)
Institutional Ownership			0.012***			0.025			0.048
			(4.34)			(0.77)			(0.50)
Largest-holder Ownership			0.002			-0.162***			-0.247*
			(0.44)			(-3.52)			(-1.90)
Constant	-0.056***	-0.111***	-0.102***	1.117***	0.260**	0.267**	3.927***	3.457***	3.337***
	(-9.13)	(-7.51)	(-6.84)	(20.63)	(2.10)	(2.04)	(17.81)	(6.04)	(5.63)
Observations	53,501	51,506	51,236	16,862	16,410	16,325	16,980	16,487	16,400
R^2	0.20	0.21	0.21	0.04	0.07	0.08	0.20	0.23	0.23

Table 8. Bond Defaults of Firms with Stock Pledged Loans

This table reports the Probit regression results of bond defaults on firms with various levels of stock pledged ratios by the largest shareholder for the sample of non-SOE firms. The sample period is year 2018. Default is a dummy variable taking the value of 1 if the firm defaults on its bond in a given quarter, and zero otherwise. Pledged Ratio is the percentage of the largest shareholder's ownership that is pledged at the end of 2016. Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of last quarter. See detailed variable definitions in Appendix. In all the specifications we control for quarter and the industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by quarters and by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

	Default	Default	Default	Default
Variables	(1)	(2)	(3)	(4)
Pledged Ratio	1.427***	0.758*	0.792*	1.001**
	(3.26)	(1.91)	(1.84)	(2.10)
Size		0.297**	1.061***	1.590***
		(2.16)	(5.89)	(4.40)
B/M		2.200***	2.793***	3.373***
		(5.65)	(5.06)	(4.41)
LEV		5.261***	2.590**	3.674**
		(4.98)	(2.55)	(2.49)
Cash		-31.110***	-27.113***	-32.001***
		(-3.28)	(-3.28)	(-3.67)
ROA			-20.001***	-24.633***
			(-6.80)	(-5.65)
Independent Director				-11.253***
				(-3.15)
Institutional Ownership				-3.338***
				(-3.20)
Largest-holder Ownership				-0.108
				(-0.10)
Constant	-2.961***	-16.439***	-28.463***	-32.963***
	(-6.10)	(-5.89)	(-7.05)	(-5.45)
Observations	6,670	4,490	4,475	4,388
Pseudo R^2	0.36	0.65	0.74	0.77

Table 9. Stock Reaction on the Approval of Stock Pledged Repo

This table reports results of the regressions where the dependent variable is the CAR for each firm measured using the CAPM over the event window [-1,1]. The sample includes firms of which the largest shareholders with no shares pledged at the end of 2012. The event refers to the regulation on the approval of stock pledge repo on May 24th, 2013, issued by Shanghai Exchange, Shenzhen Exchange and China Securities Depository and Clearing Corporation. Age, Current Ratio, PPET, Natural Person, Securities, Financial Sector Weight, SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of 2012. In all specifications we control the industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Variables	(1) CAR[-1,1]	(2) CAR[-1,1]	(3) CAR[-1,1]	(4) CAR[-1,1]	(5) CAR[-1,1]	(6) CAR[-1,1]
Payout Ratio	0.002	0.001	0.001	0.001	0.002	0.001
	(0.56)	(0.45)	(0.40)	(0.32)	(0.51)	(0.43)
Cash	-0.031***	-0.031***	-0.030***	-0.030***	-0.032***	-0.031***
	(-3.96)	(-3.92)	(-3.88)	(-3.85)	(-4.00)	(-3.97)
Size	-0.007***	-0.006***	-0.006***	-0.006***	-0.006***	-0.006***
	(-6.98)	(-6.07)	(-6.18)	(-6.22)	(-5.11)	(-5.11)
Age	-0.001***	-0.000**	-0.000**	-0.000**	-0.000***	-0.000***
	(-3.02)	(-2.43)	(-2.47)	(-2.51)	(-2.65)	(-2.71)
LEV	-0.008	-0.006	-0.005	-0.004	-0.007	-0.006
	(-1.40)	(-0.96)	(-0.87)	(-0.70)	(-1.15)	(-0.99)
Current Ratio	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.27)	(-0.39)	(-0.39)	(-0.29)	(-0.48)	(-0.37)
B/M	-0.013***	-0.011***	-0.011***	-0.012***	-0.012***	-0.013***
	(-3.74)	(-3.20)	(-3.23)	(-3.34)	(-3.22)	(-3.35)
PPET	-0.023***	-0.022***	-0.021***	-0.021***	-0.021***	-0.021***
	(-3.49)	(-3.35)	(-3.20)	(-3.11)	(-3.15)	(-3.05)
SOE		-0.006	-0.006	-0.006	-0.006	-0.006
		(-1.49)	(-1.56)	(-1.53)	(-1.49)	(-1.46)
Natural Person		0.001	0.001	0.000	0.001	0.000
		(0.14)	(0.13)	(0.07)	(0.18)	(0.11)
Securities				0.001**		0.001**
				(2.29)		(2.40)
Financial Sector Weight			0.028		0.026	
			(1.24)		(1.17)	
ROA					-0.015	-0.016
					(-0.65)	(-0.67)
Independent Director					0.024	0.024
					(1.52)	(1.57)
Institutional Ownership					0.005	0.005
					(1.04)	(1.01)
Largest-holder Ownership					-0.008	-0.008
					(-1.28)	(-1.36)
Constant	0.134***	0.138***	0.138***	0.135***	0.132***	0.128***
	(6.45)	(6.59)	(6.61)	(6.46)	(5.89)	(5.72)
Observations	2,001	1,993	1,993	1,993	1,975	1,975
R^2	0.14	0.15	0.15	0.15	0.15	0.15

Table 10. The Largest Shareholders' Reaction on the Approval of Stock Pledged Repo

This table reports results of the regressions where the dependent variable *Pledge* is the dummy variable taking the value of one if the percentage of the largest shareholder's ownership that is pledged increases (from zero) during year 2013, and zero otherwise. The sample includes firms of which the largest shareholders with no shares pledged at the end of 2012. Age, Current Ratio, PPET, Natural Person, Securities, Financial Sector Weight, SOE, Size, B/M, LEV, Cash, ROA, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics at the end of 2012. See detailed variable definitions in Appendix. In all specifications we control the industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Variables	(1) Pledge	(2) Pledge	(3) Pledge	(4) Pledge	(5) Pledge	(6) Pledge
Payout Ratio	-0.150	-0.273*	-0.257*	-0.253*	-0.289**	-0.285*
	(-1.11)	(-1.90)	(-1.79)	(-1.75)	(-1.97)	(-1.94)
Cash	-0.269	-0.205	-0.199	-0.196	-0.233	-0.226
	(-0.82)	(-0.59)	(-0.57)	(-0.56)	(-0.65)	(-0.63)
Size	-0.082*	0.039	0.051	0.043	0.046	0.032
	(-1.92)	(0.82)	(1.07)	(0.91)	(0.80)	(0.56)
Age	-0.014*	0.002	0.003	0.002	0.005	0.004
	(-1.95)	(0.31)	(0.39)	(0.29)	(0.65)	(0.55)
LEV	0.405*	0.905***	0.847***	0.838***	0.388	0.393
	(1.68)	(3.43)	(3.19)	(3.15)	(1.33)	(1.35)
Current Ratio	-0.035**	-0.038**	-0.039**	-0.040**	-0.046**	-0.048**
	(-2.01)	(-2.11)	(-2.13)	(-2.21)	(-2.42)	(-2.52)
B/M	-0.704***	-0.374**	-0.368**	-0.344**	-0.523***	-0.489***
	(-4.48)	(-2.22)	(-2.17)	(-2.03)	(-2.93)	(-2.74)
PPET	-0.887***	-0.640**	-0.750**	-0.717**	-0.940***	-0.891***
	(-3.12)	(-2.06)	(-2.38)	(-2.29)	(-2.92)	(-2.79)
SOE		-0.643***	-0.614***	-0.639***	-0.668***	-0.703***
		(-3.52)	(-3.34)	(-3.49)	(-3.59)	(-3.79)
Natural Person		0.648***	0.660***	0.664***	0.675***	0.679***
		(3.78)	(3.83)	(3.86)	(3.87)	(3.90)
Securities				-0.062**		-0.073***
				(-2.47)		(-2.87)
Financial Sector Weight			-2.807**		-3.413***	
			(-2.48)		(-2.93)	
ROA					-3.222***	-3.079***
					(-3.12)	(-2.99)
Independent Director					0.009	0.036
					(0.01)	(0.05)
Institutional Ownership					0.386*	0.380*
					(1.95)	(1.93)
Largest-holder Ownership					0.826***	0.853***
					(3.06)	(3.15)
Constant	0.647	-2.006**	-1.937**	-1.804**	-1.857**	-1.678*
	(0.88)	(-2.37)	(-2.28)	(-2.12)	(-1.97)	(-1.78)
Observations	1,999	1,990	1,990	1,990	1,972	1,972
Pseudo R^2	0.14	0.15	0.15	0.15	0.15	0.15

Table 11. Diff-in-Diff Analysis Before and After the Approval of Stock Pledged Repo

This table reports results of Difference-in-Difference tests. The sample includes observations from 2011 to 2014. For columns (1)-(3), the dependent variables are ROA. For columns (4)-(6), the dependent variables are Investment, calculated as (The increase of inventories + the increase of fixed assets)/total assets (Chen, Novy-Marx and Zhang, 2010). *Treat* is a dummy variable taking the value of one if the percentage of the largest shareholder's ownership that is pledged increases (from zero) during year 2013, and zero for control firms identified using the Propensity Score Matching method (in the same industry, and have propensity scores that differ from the treatment firm's propensity score by no more than 15%) and with no shares pledged by the largest shareholders during 2013. For all columns, we include treatment firms and their corresponding comparable firms only. *Post* equals one for observations in 2013 and 2014, and zero for observations in 2011 and 2012. SOE, Size, B/M, LEV, Cash, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics of last year. See detailed variable definitions in Appendix. In all specifications we control the year and industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by years and companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Variables	(1) ROA	(2) ROA	(3) ROA	(4) Investment	(5) Investment	(6) Investment
Treat	0.004	0.004	0.003	0.008	0.007	0.005
	(0.97)	(1.00)	(0.91)	(0.79)	(0.62)	(0.43)
Post	-0.003	-0.003	-0.002	-0.011	-0.009	-0.007
	(-0.92)	(-0.77)	(-0.66)	(-0.93)	(-0.73)	(-0.52)
Treat*Post	0.004*	0.009***	0.008***	0.005	0.002	0.002
	(1.74)	(3.65)	(3.24)	(1.15)	(0.23)	(0.20)
SOE		-0.007*	-0.010**		0.003	0.001
		(-1.69)	(-2.51)		(0.32)	(0.14)
Size		0.016***	0.013***		0.003	0.003
		(8.43)	(6.61)		(0.59)	(0.57)
B/M		-0.028***	-0.027***		-0.014	-0.019
		(-5.11)	(-4.85)		(-0.81)	(-1.13)
LEV		-0.052***	-0.058***		-0.026	-0.024
		(-6.92)	(-7.79)		(-1.27)	(-1.17)
Cash		0.024**	0.022**		0.037	0.027
		(2.31)	(2.30)		(1.59)	(1.13)
Independent Director			-0.017			-0.132**
			(-0.74)			(-2.28)
Institutional Ownership			0.029***			-0.015
			(5.14)			(-0.99)
Largest-holder Ownership			0.008			0.045*
			(0.89)			(1.89)
Constant	0.021	-0.195***	-0.155***	0.083	0.049	0.084
	(1.43)	(-6.22)	(-4.71)	(1.40)	(0.54)	(0.91)
Observations	6,664	6,429	6,341	6,571	6,343	6,255
R^2	0.04	0.19	0.21	0.02	0.02	0.03

Table 12. Diff-in-Diff Analysis in 2017 and 2018

This table reports results of Difference-in-Difference tests. The sample includes observations from 2017 to 2018. For columns (1)-(2), the dependent variable is ROA. For columns (3)-(4), the dependent variable is Cash. For columns (5)-(6), the dependent variable is Lev. *Treat* is a dummy variable taking the value of one if the percentage of the largest shareholder's ownership that is larger than 80% at the end of 2016, and zero for control firms identified using the Propensity Score Matching method (in the same industry, and have propensity scores that differ from the treatment firm's propensity score by no more than 15%) and with no shares pledged by the largest shareholder at the end of 2016. For all columns, we include treatment firms and their corresponding comparable firms only. *Post* equals one for observations in 2018, and zero for observations in 2017. Securities, SOE, Size, B/M, Independent Director, Institutional Ownership, Largest-holder Ownership are firms characteristics of last year. See detailed variable definitions in Appendix. In all specifications we control the year and industry fixed effects based on the CSRC level-1 industry classification. t-values calculated using the standard errors clustered by years and companies are reported in the parentheses. ***, ** and * denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Variables	(1) ROA	(2) ROA	(3) Cash	(4) Cash	(5) Lev	(6) Lev
Treat	-0.017	-0.019*	-0.024*	-0.028**	0.057**	0.052**
	(-1.41)	(-1.70)	(-1.92)	(-2.13)	(2.54)	(2.57)
Post	-0.014**	-0.011*	-0.009	-0.009	0.008	0.008
	(-2.14)	(-1.75)	(-1.36)	(-1.39)	(1.18)	(0.96)
Treat*Post	-0.065***	-0.061***	-0.007	-0.007	0.083**	0.072**
	(-3.35)	(-2.95)	(-0.77)	(-0.77)	(2.56)	(2.19)
SOE		-0.018	0.027	0.024		0.128**
		(-1.19)	(1.28)	(1.06)		(2.17)
Size		0.002	-0.001	-0.003		0.076**
		(0.13)	(-0.05)	(-0.26)		(1.97)
B/M		-0.013	-0.075***	-0.075***		0.080
		(-0.36)	(-3.17)	(-3.14)		(1.03)
Independent Director		0.049		0.132		-0.304
		(0.44)		(1.25)		(-1.32)
Institutional Ownership		0.100***		0.003		-0.181*
		(2.59)		(0.10)		(-1.67)
Largest-holder Ownership		0.037		0.086		0.097
		(0.85)		(1.50)		(0.92)
Constant	0.053**	-0.062	0.220	0.171	0.557***	-0.605
	(2.00)	(-0.27)	(1.38)	(0.89)	(6.26)	(-1.04)
Observations	2,822	2,624	2,636	2,624	2,822	2,624
R^2	0.06	0.08	0.08	0.09	0.08	0.12

Appendix
Data Sources and Variable Definitions

Variable	Definition
WIND	
Pledged Ratio	Percentage of the largest shareholder's ownership that is pledged at the end of 2016.
High Pledge	Equal to one if the percentage of the largest shareholder's ownership that is pledged at the end of 2016 is larger than 80%, and zero otherwise.
Zero Pledge	Equal to one if the percentage of the largest shareholder's ownership that is pledged at the end of 2016 is zero, and zero otherwise.
Pledge	Equal to one if the percentage of the largest shareholder's ownership that is pledged increases (from zero) during year 2013, and zero otherwise.
Default	Equal to one if the firm defaults on its bond in the given quarter, and zero otherwise.
Securities	Number of business departments of securities companies in a given province/the area of the province.
Financial Sector Weight	Financial sector added value of a given province /GDP of the province.
CSMAR	
Monthly Returns	Monthly stock returns of firms, adjusted for stock split and include cash dividends.
Daily Returns	Daily stock returns of firms, adjusted for stock split and include cash dividends.
Dum2017	Equal to one if the firm-date observation is in year 2017, and zero otherwise.
SOE	Equal to one if firm is ultimately controlled by the central State-owned Assets Supervision and Administration Commission of the State Council (SASAC), local SASAC, Ministry of Finance, or other government agents, and zero otherwise.
Prior Ret	The three-month buy-and-hold return ending on last month (quarter).
Size	The natural logarithm of the market capitalization of equity.
B/M	Book assets/market capitalization of equity.
LEV	Total liabilities/total assets.
Cash	Cash and cash equivalents /total assets.
ROA	Net income trailing twelve months /total assets.
Independent Director	Proportion of independent director to board size.
Institutional Ownership	Percentage of shareholdings for institutional investor.
Largest-holder Ownership	Percentage of shareholdings for the largest shareholder.
Firm-Specific Daily Return	Equal to ln (1+ residual), where the residual is $\varepsilon_{i,t}$ from the expanded index-model regression: $r_{i,t} = a_i + b_1 * r_{m,t-2} + b_2 * r_{m,t-1} + b_3 * r_{m,t} + b_4 * r_{m,t+1} + b_5 * r_{m,t+2} + \varepsilon_{i,t}$
DUVOL	The standard deviation of the Firm-Specific Daily Return over the quarter if Firm-Specific Daily Return is negative/ the standard deviation of the Firm-Specific Daily Return over the quarter if Firm-Specific Daily Return is positive.
Crash Freq	The frequency within quarter when a firm's Firm-Specific Daily Return falling 1.645 or more standard deviations below the mean of Firm-Specific Daily Return for the last twelve months.
Mom	The three-day buy-and-hold return before date t.
Neg Mom	Equal to one if Mom is negative, and zero otherwise.
CrMom	We construct an equal-weighed portfolio of firms that the percentage of the largest shareholder's ownership pledged at the end of 2016 is larger than 95%. For date t, we calculate the three-day buy-and-hold return of the portfolio before date t.
Neg CrMom	Equal to one if CrMom is negative, and zero otherwise.
Payout Ratio	Dividend per share before tax/(Net income/ paid-in capital).
Age	The number of years since a firm's foundation.
Current Ratio	Current asset/current liabilities.
PPET	Net book value of fixed assets/current liabilities.
Natural Person	Equal to one if firm is ultimately controlled by natural persons, and zero otherwise.
Investment	(The increase of inventories + the increase of fixed assets)/total assets