Leverage Made at Home:

Investors' Margin Loan Usage and Firm Leverage

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Abstract

The "homemade leverage" conjecture by Modigliani and Miller (1958) implies that firm leverage and its investors' leverage are substitutes. Using the data of margin loans by Chinese stock investors, we test if investors take fewer margin loans on a stock when the company increases leverage. Based on a sample of 2,600 bank loan announcements, we find a significant decline in the use of margin loans by investors immediately after these leverage-increasing events. This effect is driven by the post-announcement increase in margin loan repayment and is stronger for firms with higher institutional ownership. The findings suggest that investors undo the change in firm leverage by adjusting the use of margin loans, supporting the "homemade leverage" conjecture.

1. Introduction

One of the fundamental ideas in finance is that stock investors who desire a high leverage level can buy the shares of an unlevered company with borrowed money, i.e., homemade leverage. This idea is key to Modigliani and Miller (1958) theory of capital structure. However, there is little empirical evidence on whether and how investors use personal leverage to adjust their exposure to a company's leverage. Answering this question poses several empirical challenges. First, it requires observations on the amount of loans that investors borrow for purchasing stocks. Second, conventional leverage measures based on accounting information only become known to investors on earnings announcement days. As a result, it is difficult to distinguish between investors' reaction to earnings and response to leverage changes.

This paper fills the gap by combining the official dataset of stock-level margin loans in China with firms' bank loan announcements. In particular, we use data on margin loans from the Shanghai Security Exchange as a measure for homemade leverage. To capture firm leverage changes, we utilize the bank loan announcements data from CSMAR (China Stock Market & Accounting Research Database). CSMAR collects bank loan-related announcements from an officially designated web on which publicly listed firms in China make disclosures to the public. We investigate whether investors take fewer margin loans on a stock when the company increases leverage. Suppose initially an investor borrows money from a brokerage margin account to buy shares of a company and achieves the desired leverage level. Upon the announcement of a new loan by the firm, we expect that the investor will tend to reduce the use of margin loans and adjust to the new level of company leverage. In particular, we expect the investor to repay her margin loans after the announcement, which result in a lower balance of margin loans.

Using the (daily) change in scaled margin loan balance as the dependent variable, our main regression results indicate that investors decrease their use of margin in stock investment immediately after loan announcements. The decrease in margin loan balance is 0.03% of the previous day's market capitalization with high statistical

significance. The economic significance is also sizable, i.e., ten times of the average change in scaled margin loan balance. Moreover, we argue that investors should reduce more margin loans if the size of the bank loan is larger. We confirm this hypothesis by showing that a one-standard-deviation increase in loan amount corresponds to a significant decrease in margin loan balance as large as 0.006%. Therefore, investors' response is indeed stronger if the firm announces a larger bank loan, lending further support to the "homemade leverage" hypothesis.

Furthermore, consistent with our argument, we show that a surge in margin repayment following new bank loan announcements drives the decrease in margin balance. Specifically, the change in margin loan balance is the difference between new margin volume and the repayment of initially outstanding loan balance. Investigating the two components separately, we find that although both components react positively to new loans, the increase in repayments dominates. As a result, we observe a reduction in margin loan balance following loan announcements.

According to the results of an experiment designed by Levy, Levy, and Alisof (2004), individual investors are not able to integrate cash flows from stocks and risk-free asset. Therefore, we expect institutional investors to be more responsive to companies' loan announcements. Consistent with this hypothesis, we find that the post-announcement margin loan decrease is indeed much larger for firms with higher institutional ownership. Our results are also robust to alternative sample period and investor leverage measures. Shadow margin loans prevailed in the Chinese stock market during the period between the second half of 2014 and mid-2015. We show our results also hold in this period. We do not include short selling in our main results as the bulk of leveraged trading activities in China takes the form of margin purchase, with short selling volume being minimal compared with margin purchase volume. However, adding short-selling activities into our measure of investor leverage leads to qualitatively similar results.

Our paper makes several contributions to the literature. Firstly, we confront the seminal "homemade leverage" hypothesis outlined in Modigliani and Miller (1958)

with data. Modigliani and Miller (1958) have shown that in a world without frictions, capital structure is irrelevant to firm value as investors are able to create homemade leverage that offsets different debt-equity combinations chosen by a particular firm. Levy, Levy, and Alisof (2004) design an experiment in which participants have to choose from several portfolios. They find that investors fail to integrate cash flows from stocks and risk-free asset. Their finding implies that individual investors are not capable of forming homemade leverage. Stafford (2017) shows that the use of financial leverage is one key element in replicating PE investment using public equities. Our work does not aim to investigate the firm value relevance of capital structure. Instead, we examine whether the empirical pattern uncovered in the margin trading data is consistent with the "homemade leverage" hypothesis. The evidence in our paper provides strong support to the hypothesis. We show that investors adjust their leverage positions following changes in the leverage of firms in which they are shareholders. Institutional investors are particularly better in incorporating portfolio firms' leverage into the homemade leverage decision.

While there exists voluminous research that examines the short selling behavior of investors[1], studies on margin purchase are relatively scant. Traditionally, literature related to margin purchase focuses on the implications of margin requirements to stock return volatility, liquidity, and market efficiency (Hsieh and Miller 1990, Hardouvelis and Peristiani 1992, Kahraman and Tookes 2017). Thanks to the release of margin purchase data, several recent papers look at how margin loans affect investor behavior. Heimer and Imas (2020) show that restrictions on investor leverage in the retail foreign exchange market lead to a decline in trading volume and reduce traders' underperformance. Similarly, Braggion, Frehen, and Jerphanion (2020) find that margin loan borrowers buy overpriced shares and incur large losses during the 1720 South Sea Bubble. Deleveraging by margin investors during market downturns could have liquidity externalities. Using investor margin accounts data, Bian, He, Shue, and

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[1] These include the information content of short sales (Boehmer, Jones and Zhang, 2008; Christophe, Ferri and Angel, 2004), the impact of intervention on shorting volume (Boehmer, Jones and Zhang, 2013), etc.

Zhou (2018) document deleverage-induced fire sales during the 2015 stock market crash in China. Several recent papers investigate the return predictability of margin trading activities in the Chinese stock market. Chang, Luo, and Ren (2014) find that margin purchase in general lacks return predictability, while short-sellers' trades predict future returns and short selling improves market efficiency. Relying on a refined measure of short-selling, Li, Li, Li, and Wu (2018) also document significant return predictability of short selling. Our paper takes a different perspective and considers margin trading by investors as a means of constructing homemade leverage. And consistent with this conjecture, we find that part of the variations in margin purchase activities could be attributed to investors adjusting their leverage positions to changes in firm leverage.

Our paper also adds to the literature on bank loan announcements. It is traditionally believed that because of banks' superior information possession regarding borrower firm quality, new loans should convey positive information to the market. Earlier research by James (1987), Preece and Mullineaux (1994), and Billett, Flannery, and Garfinkel (1995) offers evidence in support of this hypothesis. Later, Maskara and Mullineaux (2011) point out that previous studies on bank loan announcements rely on small samples that are not representative of the whole loan population. Using a more representative sample, they show that the abnormal return to new loan announcements is insignificantly different from zero. Moreover, they demonstrate that the self-selection concern in announcing new loans tends to contaminate extant research on loan announcements. Contrary to the evidence from US data, both the two papers by Bailey, Huang and Yang (2011) and Huang, Schwienbacher and Zhao (2012) find that stock price reacts negatively to new bank loan announcements in China. We contend that while investors try to decipher the information embedded in new bank loans and perhaps trade on the information, they also adjust their leverage positions in the direction predicted by the "homemade" leverage hypothesis. Actually, by observing the announcements of loans, investors get to know the leverage adjustment of firms in a timely fashion.

The rest of the paper is organized as follows. Section 2 describes the data and methodology used in this paper. We summarize empirical findings in Section 3. Section 4 concludes the paper.

2. Data

On March 31, 2010, China Securities Regulatory Commission (CSRC) began to allow margin purchase and short selling on 90 pilot stocks, all of which are large and liquid stocks in the Shanghai Exchange 50 Index and Shenzhen Component Index. The number of eligible stocks increased gradually over the next four years to 900 stocks in September 2014, and later to 1600 stocks in 2019. We obtain margin loan balance for each eligible stock at the end of each day, as well as daily margin purchase turnover and daily covered margin purchase volume from Shanghai Security Exchange's official website. As a result of the small number of stocks eligible for margin loans during 2010 to 2012, there are very few bank loan announcements made by sample firms. Our sample, therefore, is from 2013 to 2019. We obtain firm accounting information (e.g., firm leverage) and stock prices from CSMAR.

We obtain bank loan announcements from CSMAR which collects bank loan-related announcements from an officially designated web portal named Juchao Info on which publicly listed firms in China make disclosures to the public.[2] The whole sample includes 121,305 announcements issued by 3,508 firms listed on the A-share market of China. As shown in the Appendix, the sample starts from 2000, with the coverage of bank loans being relatively small in the early stage. Studies such as Bailey, Huang and Yang (2011) search bank loan-related announcements in various outlets such as newspapers, magazines, and websites. Huang, Schwienbacher and Zhao (2012) use keyword-searching to identify news related to banks from the universe of news provided by two data vendors. In comparison, our data features the most comprehensive coverage of listed companies and hence the largest number of loans issued by Chinese

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[2] Juchao Info (http://www.cninfo.com.cn/new/index) is the first web portal in China that allows firms listed on Shanghai and Shenzhen stock exchange to provide disclosure to the public.

firms.

Margin eligible firms that have never made bank loan announcements during the sample period are excluded from our sample. We drop loans for which the loan amount is zero or missing. We also exclude announcements related to guarantee agreements between the listed firm and its subsidiaries (or parent firm), as these agreements constitute only contingent liabilities to the company. We drop loans that are announced within two weeks after another loan announcement. To minimize the impact of confounding events, we follow existing studies and exclude loan announcements that coincide with earnings announcements of the same company.

The loan announcement sample contains 2,644 announcements by 621 listed firms from 2013 to 2019. The distribution of announcements and firms over time is presented in Panel A of Table 1. Panel B shows that the size of loans in our sample is fairly large, with the average loan amount as high as 2.4 billion Chinese Yuan (approximately 338 million USD under the current exchange rate). The distribution of loan amounts is right-skewed, with the third quartile being 1.05 billion, much smaller than the average. To take into account firm size, we scale the loan by lagged total firm liability. On average, a bank loan is 24% of the total liability. The distribution of the scaled loan amount is also heavily skewed to the right, with the 75 percentile being 21%, smaller than the mean.

Panel C shows the summary statistics of measures of margin purchase activities. The average outstanding margin loan balance ($mbal$) is equivalent to 5.5% of the firm's previous-day market capitalization. The change in margin loan balance ($\Delta mbal$) is quite small, with the mean equal to 0.003%. The volatility, however, is as large as 0.22%. New margin volume ($purchase$) and the margin loan repayment ($repay$) are about 0.4% of the market cap.[3]

Panel D shows the summary statistics of firm characteristics. The sample includes 20,732 firm-quarter observations between 2013 and 2019. The mean of market leverage,

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[3] Each day, about 18% of trading volume is financed by margin loans, and the repayment amount is of similar magnitude.

which is defined as total debt scaled by the market value of assets, is 36.1%. Note that on average market leverage is smaller than book leverage for our sample firms, indicating that the market value of equity is higher than book equity. The average quarterly return is equal to 0.03. Each quarter, the trading volume is on par with the market capitalization. The average equity beta is around 1.

3. Empirical Evidence

3.1 Margin loans and firm leverage

We start the empirical analysis by examining the relationship between the margin loan balance and firm leverage using purely cross-sectional data, i.e., firm-quarter observations. Figure 1 displays the relation by sorting quarterly observations of margin loan balance into 50 groups based on firms' market leverage or book leverage as of the last quarter. Quarterly margin balance is defined as the average daily balance (scaled by firms' market cap as of the previous trading day) of firm i across all the trading days in quarter t. The figure shows a clear pattern that investors' leverage is higher for companies with lower leverage. Therefore, consistent with the prediction of "homemade leverage" hypothesis, investors take margin loans to buy shares of companies that has a low leverage.

Firm characteristics, such as size and firm risk, could affect both firm leverage and the margin trading behavior of investors. We therefore regress margin loan balance on firm leverage, controlling for such characteristics. The regression model is specified as follows.

$$mbal_{i,t} = \pi_t + \rho_i + \beta_1 * Leverage_{i,t-1} + controls_{i,t-1} + \epsilon_{i,t} \qquad (1)$$

where $mbal_{i,t}$ represents the average margin loan balance of firm i across all the trading days in quarter t. $Leverage_{i,t-1}$ is the leverage of firm i in quarter $t-1$. π_t and ρ_i are quarter and firm fixed effects. The time fixed effect absorbs market-level variations in margin trading. Firm fixed effect (ρ_i) captures firm-specific time-invariant

margin purchase intensity. As for other control variables, we follow Chang et al. (2014) and control for size, volatility, turnover ratio, and the market beta. Size is the market capitalization at the end of last month. Volatility is calculated as the standard deviation of daily returns from the last twenty days. Turnover is the number of traded shares as a fraction of outstanding shares during the last quarter.

Table 2 reports the results. To be consistent with theory, we follow Danis, Rettl and Whited (2014) and use firms' market leverage as the main proxy for financial leverage. The coefficient estimates of market leverage (*MLeverage*) in Columns (1) - (4) indicate a significant substitution between investors' leverage and firm leverage. Take the coefficient estimate in Column (4) as an example. A one-standard-deviation increase in firm leverage in the last quarter is associated with an increase in margin loans as large as 0.4% in the current quarter, which is equivalent to 11% of the standard deviation of *mbal* in our sample. In column (5), we use book leverage as an alternative measure and find similar results. In sum, the OLS estimation results suggest that investor leverage and firm leverage are substitutes, which supports the "homemade leverage" hypothesis.

3.2 Loan announcement results

We now turn to the analysis of margin loan usage around bank loan announcements. Unlike the previous section that aggregate daily margin loans within each quarter, tracking the daily margin loan balance around loan announcements enable us to examine the change in investors' leverage immediately after the change in firm leverage. If investors use homemade leverage to adjust their exposure to a company's leverage, we expect the margin loan balance to decline following an announcement of new bank loan.

Figure 2 depicts the change in margin loan balance during the 30-day window around the loan announcement date. In particular, it plots the mean and the 95% confidence interval of the change in margin loan balance from 15 days before the loan announcements to 15 days after. We observe a decline in margin balance by 0.015% on

the day of the loan announcement. It is significantly different from zero at the 95% confidence level. The result suggests that after observing the bank loan announcement, investors borrow less money for buying the shares of the company, consistent with the "homemade leverage" hypothesis. During the post-announcement period, the change in margin loan balance is always insignificantly different from zero, implying that investors make an immediate response to the announcement. More importantly, we do not observe a reversal of the margin loan balance during the post-announcement period. Before the announcement, changes in margin balance are also largely insignificant, except for day -10 when investors seem to increase their leverage by 0.01%.

To account for the impact of firm characteristics on the change in investors' usage of margin loans, we estimate the following regression

$$\Delta mbal_{i,t} = \theta_t + \rho_i + \theta_1 * Ann_{i,t} + controls_{i,t} + \epsilon_{i,t} \tag{2}$$

where the dependent variable $\Delta mbal_{i,t}$ represents the change in margin loan balance of stock i at day t scaled by the market capitalization of the previous day. Announcement (*Ann*) is a dummy variable equal to one on day t if there is a loan announcement on that day and zero otherwise. In some specifications, we also include the dummy for the day before the announcement and the day after to examine the pre- and post-announcement dynamics. To take into account the possibility that margin purchases could be driven by past stock prices, we control for past returns (cumulative return between day -5 and day -1). Moreover, bank loan announcements themselves could be good or bad to the company's valuation, which in turn change investors' margin loan demand. We control for a loan announcement's valuation effect by using stock returns on the announcement day, as well as the cumulative return from day 1 to day 5 following Christophe et al. (2004). Standard errors are clustered on the firm level.

Table 3 presents the regression results of equation (2). Column 1 includes only the announcement dummy as independent variable. It shows that margin balance significantly decreases after loan announcements, consistent with Figure 2. The coefficient on *Announcement* is - 0.029%, meaning that the decrease in margin balance

is about 3 basis points of market capitalization. The magnitude is economically significant given that the average change in margin loan balance of the sample is only 0.0032%, one-tenth of the coefficient estimate. Column 2 shows that the result barely changes when we include firm and quarter fixed effects. Note that adding fixed effects only increases the R-square by 0.02, suggesting the margin loan balance changes are rather volatile both across firms and over time.

Column 3 includes firm characteristics as control variables, such as size, volatility, turnover, and beta. Prior research suggest that bank loan announcements contain value-relevant information (e.g., James (1987), Preece and Mullineaux (1994), Billett, Flannery, and Garfinkel (1995) and Maskara and Mullineaux (2011)). Therefore, the change in the use of margin loans might be a response to the new information revealed by the loan announcement. To control for such news content, we also add returns on announcement day, returns on the previous five days, and returns on the future five days in the list of control variables.[4] The coefficients on contemporary and past returns are positive and highly significant, suggesting that good news increases investors' use of margin loans. The coefficient on future returns has a smaller magnitude compared to those on current and past returns. The negative sign indicates that at least in the short run, margin traders do not have an information advantage.

Column 4 adds another two dummy variables, i.e., *1-day before* (*after*) that equals one if a company has a loan announcement on the previous (next) day. With the two variables, we aim to investigate if there is any post-announcement reversal in changes of margin loans and if there is margin loan usage that is driven by information leakage before announcements. The results show that both coefficients on the two dummies are insignificant and have a much smaller magnitude than *Announcement*. Therefore, it seems that margin traders do not anticipate the announcement before it is made. More importantly, we do not observe any reversal one day after the announcement. Combined with the post-announcement margin loan dynamics depicted in Figure 2, this finding implies that the decline in margin loan balance is not transitory, at least during the three

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[4] We explicitly tackle this issue in Section 4.1.

weeks after the announcements.

According to our hypothesis, larger bank loans should lead to a larger decline in the margin loan balance. The last column of Table 3 presents supportive evidence. In particular, we add loan amount (scaled by total debt) that is disclosed in the announcement into the regression. The coefficient on loan amount is -0.012, suggesting that one-standard-deviation change in loan amount is associated with a decline in margin balance by around 0.006, almost 50% of the coefficient on the *Announcement* dummy of -0.014. The finding indicates that investors not only react to the fact that a loan announcement is made, they also react to the amount borrowed from banks.

Conceptually, the change in margin balance can be decomposed into the change in margin purchase and the change in margin loan repayment. To investigate the source of changes in margin loan balance, we use these two components as dependent variables. Column 1 of Table 4 shows a significantly positive relationship between the size of the firm's bank loan and margin repayment, indicating that investors react to a larger amount of bank loan by repaying more margin loans. Meanwhile, Column 2 shows that a larger bank loan also leads to a higher amount of margin purchase. Hence, some margin traders seem to react positively to loan announcement, especially to those with large size. However, the magnitude of increase in margin purchase is significantly smaller than the decrease in repayment. Therefore, the net consequence is a reduction in margin balance.

3.3 The Effect of Investor Profile

Prior literature (e.g., Levy, Levy, and Alisof (2004)) show that retail investors fail to incorporate firm leverage into their decision-making regarding the use of margin loans. If a stock is mainly held by institutional investors, we expect that investors as a whole group are more likely to factor in firms' leverage when adjusting their margin loan balance, i.e., the total margin loan balance tends to decline following bank loan announcements. The result in Table 5 confirms our hypothesis. Specifically, we interact announcement dummy with *INSTI*, the logit transformation of institutional ownership

as a percentage of shares outstanding. In particular, we follow Nagel (2005) and calculate *INSTI* as $INSTI = \log(\frac{\text{insti ownership}}{100-\text{insti ownership}})$. The coefficient on the interaction term is significantly negative at -0.008. On announcement days, a one-standard-deviation increase (1.4) in *INSTI* decreases margin balance by -0.011, around 25% of the magnitude of announcement dummy -0.042. The results suggest that indeed institutional ownership plays an important role in the adjustment of margin loan balance after bank loan announcements.

4. Additional analysis

In this section, we first explore several alternative hypotheses that also lead to the same empirical prediction and then conduct several robustness tests.

4.1 Stock return and loan announcements

As our main analysis, we attribute the changes in margin loan balance on the bank loan announcement days to investors' use of "homemade leverage" to undo changes in the leverage of firms in which they invest. As an alternative story, the estimated effect may be a result of the "specialness" of bank loans, considering the immense evidence regarding stock price reactions to new loans. Specifically, the stock return following bank loan announcements may drive the decrease in margin loans on the announcement day. To explicitly tackle this concern, we follow prior literature and calculate the abnormal return around loan announcements in our sample. We adjust firm-level stock returns with both the market return and the predicted return from a market model that is estimated using daily stock prices during the period *t*-200 through *t*-51. To take into account the possibility of information leakage and a delay in response, we consider various window lengths. The cumulative abnormal returns are shown in Table A2, with market-adjusted returns included in Panel A and returns generated using the market risk model reported in Panel B.

CAR in the window of [-2, -1] is insignificant in either Panels A or B, indicating that information leakage is not a concern in our sample. The abnormal return on the event day is around 0.1% when adjusted by market return, with the null hypothesis of

the return being equal to zero rejected at the 99% confidence level. However, CAR becomes insignificantly different from zero when the two days before the event date are also included in the calculation. When we focus on the window of [-1, 0], the abnormal return becomes larger in magnitude and is statistically significantly different from zero in Panel B. Among other window lengths, CAR is only significant for the window of [0, 1] in Panel B with market risk adjustment. In sum, the announcements of new bank loan seem to be good news for stock investors, which echoes findings using the US data (e.g., James (1987), Preece and Mullineaux (1994), Billett, Flannery, and Garfinkel (1995)). A caveat here is that the abnormal return in our sample varies with window length and the estimation approach.

The implication of loan announcements as good news on investor leverage also depends on how the usage of margin loans react to stock returns. The coefficient of contemporaneous return in Table 2 indicates that a higher current return is associated with a larger increase in the use of margin loans. The positive abnormal announcement return, however, goes against finding a significant decrease in margin loans on the announcement day. Having said that, the "uniqueness" of bank loans does not seem to explain our main findings.

4.2 Robustness

We conduct two robustness checks. Firstly, we consider a specific sample period in which our measure of investor leverage is likely to be biased. Secondly, we include short-selling activities when constructing the investor leverage measure.

The Chinese stock market began to turn bullish starting from the second half of 2014. Lured by the high return, millions of individual investors who are not qualified to borrow margin loans from their brokers, turn to shadow financing providers.[5] The rapid increase in shadow margin loan financing finally came to a halt on June 12 of 2015 when CSRC made an announcement that forbids brokerage firms to facilitate margin purchase using shadow margin loans. These leveraged trading activities are not

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[5] Compared with regulated margin loan providers, these lenders allow for more flexibility and in return charge a higher loan interest rate.

covered by regulation and hence do not enter the margin volume in our data, which may lead to measurement error of our dependent variable. We therefore perform the main test during the period with a substantial amount of shadow margin loans, i.e., July 2014- June 2015. Column 1 of Table 6 shows that our results are robust to including only this sample period.

As the second robustness check, we add the uncovered short-selling position to our original measure of investor leverage which only considers the balance of margin purchase loans. Note that it is impossible to estimate the market value of stocks that will be used to cover the short positions. We make an approximation by multiplying the uncovered short position by the mid-price of the current trading day and use this approximated value as the value of shorted stocks. Column 2 of Table 6 presents the regression using the new measure of investor leverage. Incorporating short interest leads to little change in estimation results. It is largely because in China the balance and volume of short selling are much smaller than those of margin buy.

5. Conclusion

In this paper, we use high-frequency data on the margin loan usage by stock investors to test the "homemade" leverage hypothesis raised by Modigliani and Miller (1958). Consistent with the conjecture that investors tend to undo changes in firm leverage, we find cross-sectional evidence that investors' leverage (margin loan balance scaled by market cap) and firm leverage are substitutes. In particular, we test the substitution effect using the announcement of new bank loans as a laboratory. We find that following new bank loan announcements, which represents increases in firm leverage, investors tend to adjust their use of margin loans downward. This effect is particularly large when the size of bank loans is large.

While both new margin purchase and margin repayment volume increases on the bank loan announcement day, the decrease in margin loan balance seems to be driven by the increase in the volume of margin loan repayment which is large in magnitude

than the increase in new margin purchase. Moreover, we find evidence that institutional investors are those who reduce margin position in face of loan announcements. The "uniqueness" of bank loans, however, does not seem to drive our results.

There are several limitations of this paper. First, although we have high-quality data on investors' use of margin loans, we are not able to measure the amount lent out by investors (e.g., bond investment). Second, we are not able to examine the heterogeneous response in the use of "homemade leverage" due to the lack of data on account-level margin loan changes. We leave these topics for future research.

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Figure 1: Margin balance across quartiles of firm leverage

We sort all firm-quarter observations into 50 equal groups based on firm market leverage (Panel A) and book leverage (Panel B), respectively. We then calculate the average margin balance and leverage for firm-year observations in each group.

Panel A
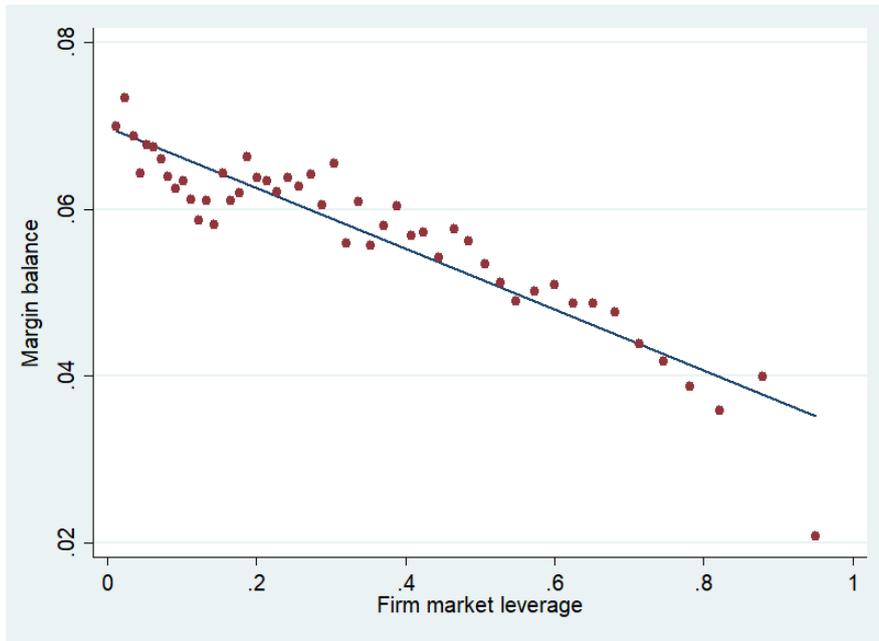
Panel B
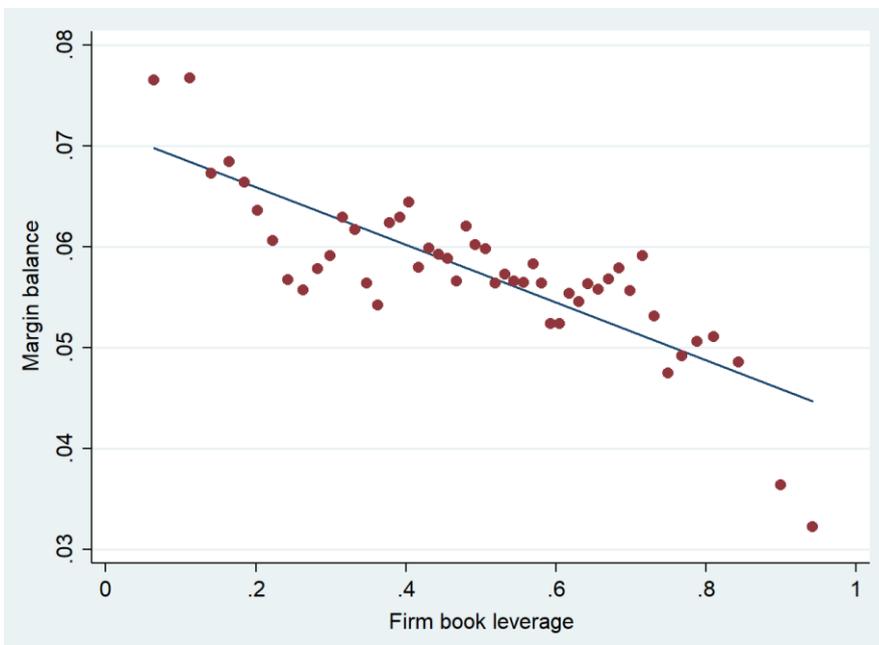
Figure 2: Margin loan balance around bank loan announcements

This figure depicts the change in margin loan balance around the announcements of new bank loans issued by publicly traded Chinese firms between 2013 and 2019. We calculate the mean of the change in margin loan balance as well as the associated 95% confidence interval during the period of [-15, 15], with date zero as the announcement date.
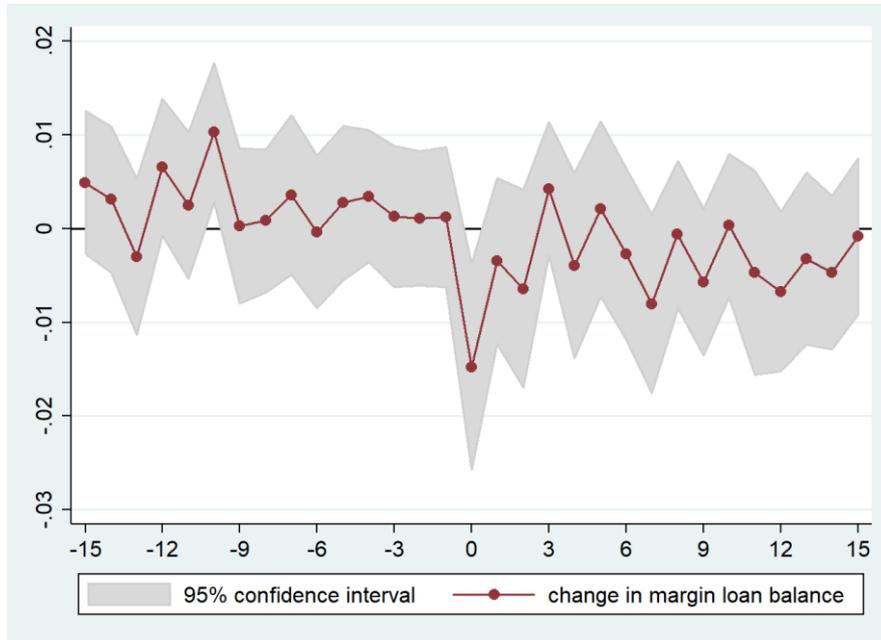
Tables 1: Summary Statistics

This table reports the summary statistics of key variables used in this paper. Panel A reports the number of announcements, number of firms, and number of firms that made announcements for each year in our bank loan announcement sample during the period from 2013 to 2019. Panel B reports the summary statistics of bank loan amount. Panel C reports the summary statistics of margin loan balance, margin buy, and margin loan repayment. Panel D shows the summary statistics of margin balance and key firm characteristics of firm-quarter observations during the sample period from 2013 to 2019.

Panel A: The distribution of loan announcements over time

Year	# of Announcement	# of Ann. Firms	# of Firms
2013	143	83	373
2014	326	189	492
2015	392	214	488
2016	381	198	511
2017	455	241	514
2018	439	231	499
2019	508	307	581
Total	2,644	621	621

Panel B: Bank loan amount

	Obs	Mean	Std. Dev.	25th	75th
Loan Amount (CNY Million)	2,644	2,411	11,838	150	1050
Loan Amount DT	2,644	24%	20%	2.7%	21%

Panel C: Margin trading activities

	Obs	Mean	Std. Dev.	25th	75th
mbal	709,595	5.46%	4.10%	3.09%	8.70%
Δmbal	709,595	0.003%	0.22%	0.048%	0.046%
purchase	709,595	0.40%	0.55%	0.089%	0.50%
repay	709,595	0.39%	0.51%	0.095%	0.50%

Panel A: Firm characteristics

	Obs	Mean	Std. Dev.	25th	75th
MLeverage	20,732	0.361	0.250	0.148	0.541
BLeverage	20,732	0.504	0.213	0.346	0.663
Size	20,732	16.569	1.032	15.847	17.105
Return	20,732	0.030	0.215	-0.101	0.142
Volatility	20,732	0.054	0.032	0.033	0.065
Turnover	20,732	1.050	1.038	0.378	1.358
Beta	20,732	1.063	0.341	0.828	1.280

Table 2. Margin Balance and Firm Leverage

This table reports regressions of margin loan balance on firm leverage. The dependent variable *mbal* is the quarterly average of daily margin balance scaled by the market capitalization on that day. *MLeverage* (*BLeverage*) is defined as total debt divided by the market (book) value of firm assets. *Size* is the market capitalization at the end of last quarter. *Volatility* is the standard deviation of daily returns during the last quarter. *Turnover* is calculated as the quarterly average of daily stock turnover that is defined as the number of traded shares as a fraction of outstanding shares. Standard errors are clustered on the firm level. The t-statistics are reported in parentheses below the corresponding coefficient estimates. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Dependent variable	*mbal*	*mbal*	*mbal*	*mbal*	*mbal*
MLeverage	-0.034***	-0.006**	-0.005*	-0.016***	
	(-9.27)	(-2.52)	(-1.91)	(-3.54)	
BLeverage					-0.009**
					(-2.28)
Size		-0.012***	-0.013***	-0.015***	-0.013***
		(-19.14)	(-18.56)	(-12.62)	(-11.80)
Return		-0.033***	-0.037***	-0.025***	-0.025***
		(-29.39)	(-24.51)	(-23.46)	(-23.50)
Volatility		-0.069***	-0.070***	-0.018**	-0.022***
		(-6.71)	(-4.37)	(-2.09)	(-2.62)
Turnover		0.019***	0.019***	0.008***	0.008***
		(33.77)	(30.49)	(17.84)	(17.59)
Beta		0.002	0.008***	0.000	0.000
		(0.94)	(4.23)	(0.08)	(0.21)
Firm FE	No	No	No	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Observations	20,732	20,732	20,732	20,732	21,160
Adjusted R-squared	0.0513	0.4401	0.5170	0.8443	0.8425

Table 3. Margin Balance and Loan Announcement

This table reports regressions of change in margin loan balance on (around) the days of new bank loan announcements. The dependent variable $\Delta mbal$ is margin balance on day t minus balance on day t-1, scaled by market capitalization on day t-1. *Announcement* is a dummy variable equal to one on day t if there is a loan announcement on that day and zero otherwise. *1-day before* (*after*) is equal to one if day t-1 (t+1) has a loan announcement. Ret is the daily return on day t. *Pre* (*post*) *5-day return* is the sum of returns on the last (future) five days. *Size* is the market capitalization at the end of last month. *Volatility* is the standard deviation of daily returns from the last twenty days. *Turnover* is the number of traded shares as a fraction of outstanding shares. Loan amount (*Loan amount DT*) is the size of the bank loan disclosed in the announcement, scaled by total debt. Standard errors are clustered on the firm level. The t-statistics are reported in parentheses below the corresponding coefficient estimates. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Dependent variable	$\Delta mbal$	$\Delta mbal$	$\Delta mbal$	$\Delta mbal$	$\Delta mbal$
Announcement	-0.029***	-0.031***	-0.017***	-0.017***	-0.014**
	(-3.62)	(-3.82)	(-2.71)	(-2.72)	(-2.18)
1-day before				-0.001	
				(-0.36)	
1-day after				-0.002	
				(-0.55)	
Loan amount DT					-0.012**
					(-1.98)
Return			1.488***	1.488***	1.488***
			(28.03)	(28.03)	(28.03)
Pre 5-day return			0.568***	0.567***	0.568***
			(39.67)	(39.67)	(39.67)
Post 5-day return			-0.068***	-0.068***	-0.068***
			(-11.38)	(-11.41)	(-11.38)
Size			0.002	0.002	0.002
			(1.52)	(1.51)	(1.53)
Volatility			0.343***	0.344***	0.343***
			(8.49)	(8.50)	(8.49)
Turnover			-0.003***	-0.003***	-0.003***
			(-6.16)	(-6.15)	(-6.16)
Beta			-0.001	-0.001	-0.001
			(-0.41)	(-0.42)	(-0.41)
Firm FE	No	Yes	Yes	Yes	Yes
Quarter FE	No	Yes	Yes	Yes	Yes
Observations	709,595	709,595	688,179	688,130	688,179
Adjusted R-squared	0.000	0.020	0.107	0.107	0.107

Table 4: Repayment and Margin Purchase

This table reports regressions of margin repayment and purchase on the amount of new bank loans. Margin repayment (*repay*) is the amount of margin loans repaid by stock investors on day t, scaled by market capitalization on day t-1. Margin purchase (*purchase*) is the amount of margin loans borrowed by stock investors on day t, scaled by market capitalization on day t-1. *Loan amount DT* is the size of the loan disclosed in the announcement, scaled by the book value of debt as of last fiscal quarter. Detailed variable definitions could be found in Appendix A1. The t-statistics are reported in parentheses. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)
Dependent variables	*repay*	*purchase*
Announcement	-0.015*	-0.016*
	(-1.85)	(-1.93)
Loan amount DT	0.070***	0.060***
	(6.04)	(5.96)
Return	1.365***	2.917***
	(34.62)	(35.96)
Pre 5-day return	1.147***	1.691***
	(29.17)	(35.41)
Post 5-day return	-0.145***	-0.198***
	(-8.88)	(-11.07)
Size	0.002	0.004
	(0.17)	(0.36)
Volatility	12.342***	12.636***
	(29.21)	(28.68)
Turnover	0.108***	0.105***
	(18.55)	(17.41)
Beta	-0.028	-0.033
	(-1.46)	(-1.64)
Firm FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	688,179	688,179
Adjusted R-squared	0.524	0.520

Table 5: The Effect of Investor Profile

This table reports regressions   that examine how the change in margin loan balance on bank loan announcement days varies with levels of institutional ownership. The dependent variable $\Delta mbal$ is margin balance on day t minus balance on day t-1, scaled by market capitalization on day t-1. *INSTI* is the fraction of total outstanding shares that are held by institutional investors. Detailed variable definitions could be found in Appendix A1. The t-statistics are reported in parentheses. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)
Dependent variable	$\Delta mbal$
Announcement	-0.042***
	(-2.87)
INSTI	0.002***
	(5.81)
Announcement $\times$ INSTI	-0.008**
	(-2.05)
Return	1.480***
	(27.76)
Pre 5-day return	0.565***
	(39.23)
Post 5-day return	-0.070***
	(-11.42)
Size	0.000
	(0.18)
Volatility	0.350***
	(8.54)
Turnover	-0.003***
	(-5.84)
Beta	0.000
	(0.20)
Firm FE	Yes
Quarter FE	Yes
Observations	668,117
Adjusted R-squared	0.108

Table 6: Robustness Check

This table reports robustness of the results. Column 1 focuses on the sample period from July 2014 to June 2015, where the dependent variable is margin balance on day t minus balance on day t-1, scaled by market capitalization on day t-1. Column 2 uses an alternative dependent variable $\Delta msbal$, defined as the change in the total amount of investor leverage, including both margin loans and uncovered short selling.. Detailed variable definitions could be found in Appendix A1. The t-statistics are reported in parentheses. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

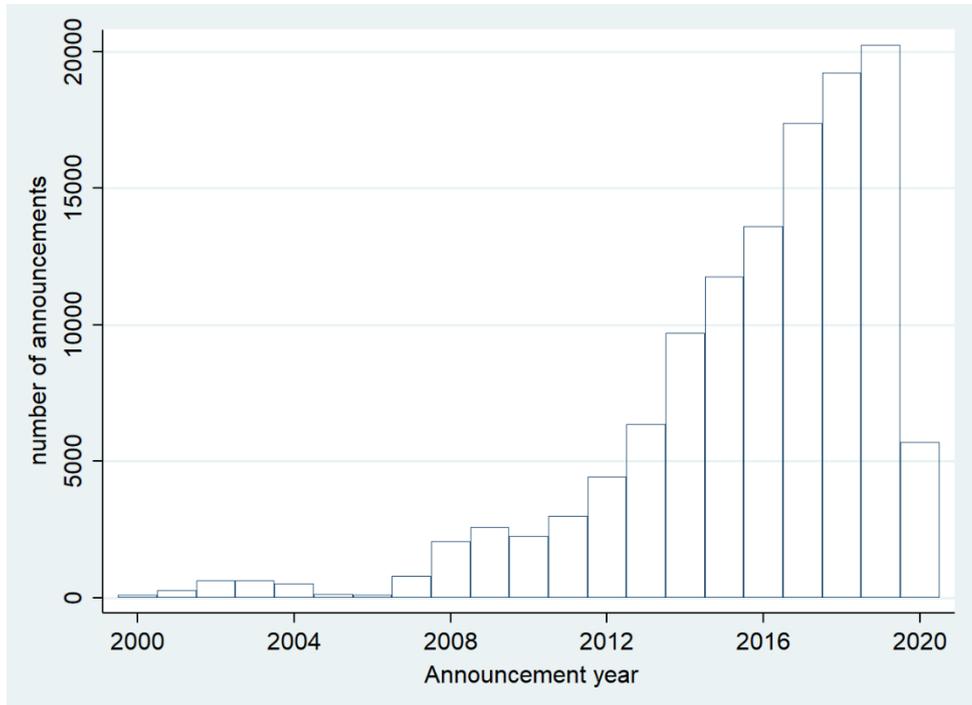|	(1)	(2)
Dependent variable	$\Delta mbal$	$\Delta msbal$
Announcement	-0.045**	-0.017***
	(-2.02)	(-2.72)
Return	1.156***	1.517***
	(14.54)	(28.52)
Pre 5-day return	0.580***	0.568***
	(25.31)	(39.69)
Post 5-day return	0.076***	-0.069***
	(4.46)	(-11.48)
Size	-0.021***	0.002
	(-2.74)	(1.53)
Volatility	-0.528***	0.337***
	(-3.67)	(8.33)
Turnover	-0.015***	-0.003***
	(-6.83)	(-6.17)
Beta	0.064***	-0.001
	(7.57)	(-0.40)
Firm FE	Yes	Yes
Quarter FE	Yes	Yes
Observations	99,678	688,179
Adjusted R-squared	0.062	0.108

Figure A1: The number of loan announcements in CSMAR bank loan database
This figure depicts the number of loan announcements included in the CSMAR bank loan database. The first loan announcement appeared in 2000. CSMAR collects bank loan related announcements from an officially designated web portal named Juchao Info on which publicly listed firms in China are able to make disclosures to the public.

Table A1: Variable definitions

Variable name	Definition	Source
Announcement	A dummy that equals one on the day of loan announcement	CSMAR
Loan amount DT	Bank loan amount scaled by beginning-of-year book value of debt	CSMAR
mbal	Margin loan balance divided by market cap of the previous trading day	WIND
purchase	New margin volume scaled by previous day's market cap	WIND
repay	The amount of repayment of margin loans scaled by previous day's market cap	WIND
MLeverage	Total debt scaled by the market value of firm assets that is defined as the sum of market capitalization of firm equity and book debt	CSMAR
BLeverage	Total debt scaled by book assets	CSMAR
Return	Return on day t	CSMAR
Pre 5-day return	Cumulative return during the period from day -5 and -1	CSMAR
Post 5-day return	Cumulative return during the period from day 1 and 5	CSMAR
Size	The natural log of market capitalization at the end of last month	CSMAR
Volatility	The standard deviation of daily returns from the last twenty days	CSMAR
Turnover	The number of traded shares as a fraction of outstanding shares during the last calendar quarter	CSMAR
Beta	The market beta estimated using (monthly) returns of the last 60 months	CSMAR
INSTI	The total percentage of institutional ownership during the previous quarter	CSMAR

Table A2: Bank Loan Announcement Abnormal Return

This table presents the abnormal returns to announcements of bank loans by Chinese listed companies between 2013 and 2019. We exclude loans announced on the same day of quarterly and annual accounting reports. In Panel A, individual stock returns are adjusted by the market return on the same day. In Panel B, excess return is calculated as the difference between the raw return and returns predicted by the market model. The parameters of the market model is estimated using daily returns over the period t-200 through t-51, with a minimum of 100 trading days.

Panel A: Market adjusted return

Window	Number of announcements	Announcement-period excess return (%)	z-statistic	Proportion of positive excess returns
[-2, -1]	2,646	-0.067	-0.963	0.451
[-2, 0]	2,646	0.037	0.434	0.473
[-1, 0]	2,646	0.083	1.191	0.481
0	2,646	0.103	2.005	0.479
[-1, 1]	2,646	0.092	1.039	0.471
[0, 1]	2,646	0.113	1.482	0.472
[0, 2]	2,646	0.063	0.675	0.469
[-2, 2]	2,646	-0.003	-0.030	0.465

Panel B: Market risk adjusted return

Window	Number of announcements	Announcement-period excess return (%)	z-statistic	Proportion of positive excess returns
[-2, -1]	2,468	-0.083	-1.131	0.452
[-2, 0]	2,468	0.059	0.664	0.467
[-1, 0]	2,468	0.121	1.668	0.474
0	2,468	0.142	2.654	0.485
[-1, 1]	2,468	0.121	1.327	0.463
[0, 1]	2,468	0.143	1.825	0.468
[0, 2]	2,468	0.130	1.362	0.456
[-2, 2]	2,468	0.047	0.398	0.460