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# How do investors view firm's customer concentration through bank loan announcements? Evidence from China\*

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## ABSTRACT

This study provides evidence on how investors evaluate the value of firms' customer concentration. This study is the first study that divides the bank loan announcement data into approved loans and rejected loans to investigate investors' reactions toward the bank loan announcements. We examine the relationship between the borrowing firm's customer concentration and cumulative abnormal returns upon approved and rejected bank loan announcements for Chinese listed firms between 2002 and 2018. The effect of firm's customer concentration on the abnormal returns is evaluated by OLS regression model controlled by some firm's characteristics. The study finds that firms with higher customer concentration incur more negative cumulative abnormal returns upon rejected loan announcements but exhibit no significant difference upon approved loan announcements.

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## KEYWORDS

Customer concentration;  
certification; monitoring

## 1 Introduction

Customer concentration – a concentration risk arising from major customers – can negatively influence a company's cash flows, especially when it loses major customers. High customer concentration may increase the interest rate spreads and the number of restrictive covenants and reduce the maturity of these loans. China Securities Regulatory Commission requires that listed firms should disclose sales information about the top five customers in their annual financial report to identify instances of customer concentration. Relying on concentrated customers who take up a major portion of sales can be very risky for a supplier because of the following reasons. First, the supplier faces the risk of losing considerable operating profits when the major customer experiences a financial crisis, switches to a new supplier, or decides to produce internally. Hertz et al. (2008) and Kolay, Lemmon, and Tashjian (2016) find that suppliers realize negative abnormal stock returns to the bankruptcy announcement of a major customer. Second, a supplier may lose anticipated cash flows from uncollectable outstanding receivables if the customer goes bankrupt. Jorion and Zhang (2009) and Kolay, Lemmon, and Tashjian (2016) noted that suppliers experience larger negative abnormal stock returns around the bankruptcy announcement of a major customer if they provide more trade credit for customers. Investigating the value of firms' customer concentration in China is motivated. First, the customer resource is considered an indispensable and unique informal system in China. Second, the stock market in China is emerging, the bank loans are still the major source of financing.

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However, customer concentration is conducive to promoting the supply-chain integrity of a company, thereby improving the business operations and performance and reducing risks by achieving zero inventory and sharing the cost with customers (Titma and Wessels, 1988; Allen and Phillips 2000). Similarly, Itzkowitz (2013) finds that the economic ties between suppliers and customers include clear contractual arrangements, creating significant economic benefits for both parties and guaranteeing future cash flow.

Regulators, investors, and researchers consider concentration risks as a significant determinant of companies' cost of debt and equity capital (Titman and Wessels 1988). Due to the steady growth of supply-chain financing, when lending money, banks consider not only the borrower but also the downstream of borrowing firms whose customer concentration is high. Considerable prior studies have investigated how a bank evaluates a company's customer concentration profile and supply-chain relations through borrowing terms like loan amount, maturity, interest rate spreads, and the number of restrictive covenants. Campello and Gao (2017) find that customer concentration increases interest rate spreads and the number of restrictive covenants but reduces the maturity in new (or renewed) bank loans.

Previous studies have shown that firms borrowing from banks enjoy significant positive abnormal returns upon the announcements of bank loan agreements. Mikkelsen and Partch (1986) and James (1987) have documented that the market reacts positively to announcements of bank loan agreements. Although firms borrowing from banks suffer performance deterioration before the loan agreements, banks' decisions to enter into loan agreements convey positive information about borrowers' credit risks and banks' abilities to monitor borrowers and achieve success. However, Bailey, Huang, and Yang (2011) have found that negative market responses occur upon loan announcement using bank loan announcements for all listed companies in China from 1999 to 2004. They concluded that bank loan approval predicts poor subsequent borrower performance, and the notion of inside debt does not hold up in the context of China's banking system. Further, Chinese banking is dominated by state-owned banks and faces substantial pressure to lend for political and social stability.

Given that customer concentration risk is priced into a supplier's cost of bank loan and negative abnormal return upon bank loan announcements in China, how investors react to the bank loan announcement of customer concentrated supplier in China is unclear and thus becomes an empirical question. Listed companies are required by the China Securities Regulatory Commission to announce major events that may significantly affect their stock price. Due to fierce peer competition, some companies are unwilling to disclose specific information about their major customers, describing them in their annual reports as major customers A, B, C, and so on. Therefore, there is severe information asymmetry between companies and investors about firms' customer concentration value. Some previous studies argue that bank loans are 'inside' debt because banks have direct access to borrowing firms' internal detailed information, which is inaccessible by investors. For example, Fama (1985) and Rajan (1992) argue that bank loans, as an 'inside' debt, can solve information problems that cannot be resolved by 'outside' debt like public bonds. To examine whether banks transmit valuable information about firms' customer concentration to investors in both approved and rejected loan announcements, this study first follows the prior research to use the measure *Top Five Customer Sales* to capture listed firms' customer concentration (CC). The cumulative abnormal returns (CAR) are then calculated upon the bank loan announcements following the standard event study methodology using daily stock returns, as shown by Brown and Warner (1985). Next, two dummy variables – State-owned Customer (SOC) and Listed Customer (LC) – are constructed to examine the effect of the customer's nature on the association between CC and CAR.

Most of the previous studies focused on exploring the factors affecting the probability of likelihood of receiving bank loans. Our study aims at providing evidence on how investors evaluate the true value of firms' CC by referring to announcements of banks' loan decisions. This demonstrates the existence of the lender bank's certification and monitoring function of the borrower firm's CC

in approved loans, thereby extending the literature on a bank's uniqueness in China's capital market.

Unlike in developed countries such as the US, in China, the interdependence between suppliers and customers is stronger and more pervasive because of the relationship-oriented rather than market-oriented business environment, which presents a unique opportunity to study CC. Chinese banks may be more likely to value the positive effects of CC on enterprises or the positive and negative effects simultaneously when offering loans to firms with high CC because of the supply-chain finance, signaling the value of borrower's CC to the market.

This study contributes to the existing literature in the following ways. First, it is the first that divides the bank loan announcement data into two types – approved loans and rejected loans – to investigate investors' reactions toward the approved bank loan announcements and rejected bank loan announcements, respectively. We found that firms with higher customer concentration incur more negative cumulative abnormal returns upon rejected loan announcements but exhibit no significant difference upon approved loan announcements. This finding implies that for firms with high customer concentration, bank loan rejection announcements are considered by investors as cleaner signals for the characteristics of their major customers than bank loan approval announcements.

Second, our study contributes to the loan contracting type literature as well. Although China has become the second-largest economy in the world, the listed companies are still depending on bank loan financing (Allen, Qian, and Qian 2005). Our study fills the gap of finding the investors' reaction on different types of CC. We found that if the borrowing firm contains a state-owned major customer or its top customer is a listed largest customer, investors react more negatively to firm's high customer concentration, but only for bank rejection announcements.

The remainder of this paper is organized as follows. In [Section 2](#), the literature related to CC and the uniqueness of bank loans are reviewed, and the research hypotheses are developed. [Section 3](#) discusses the research methodology. Our empirical results are presented in [Section 4](#). [Section 5](#) concludes this paper.

## **2 Literature review & hypothesis development**

### **2.1 Customer concentration and firm profitability**

The existing literature maintains that CC is negatively associated with supplier profits because large customers usually have stronger bargaining power over suppliers concerning purchase prices and the timing of payments. This is consistent with the phenomenon that suppliers and customers compete each other for economic profits. Galbraith (1993), Stigler (1964), and Snyder (1996) suggested that as a high CC reflects a customer's powers, it should negatively affect a supplier firm's profitability because powerful customers can bargain for and enforce favorable contract terms at the expense of the suppliers. Murfin and Njoroge (2014) further showed that large customers often delay payments, elongating receivable cycles for upstream firms. Hui, Liang, and Yeung (2019) documented that major CC is negatively associated with the supplier firm's profitability but positively associated with the major customers' profitability, and these effects weaken with the supplier firm's increasing power over its relationship with major customers.

However, some studies suggested that CC is positively associated with a firm's profitability because of synergy, trust, and control over customers. Thus, CC facilitates operational collaboration (e.g. zero inventory and cost-sharing), ensuring higher profits for both the supplier firm and its primary customers. Gosman et al. (2004) found that firms with a high CC report higher accounting profitability than their industry peers. Patatoukas (2012) found a positive relationship between CC and accounting rates of return. Interestingly, Irvine, Park, and Yildizhan (2016) proposed a collaboration relationship life-cycle hypothesis predicting the association between major CC

and firm profitability, which is negative for a relatively new relationship but positive for a mature relationship.

## **2.2 Customer concentration and cost of bank loan**

Recent studies have found a positive relationship between CC and supplier's cost of bank loans. Kim, Song, and Zhang (2011) have shown that the company's major customers' performance will affect the bank loan conditions, and this impact will increase with the company's growing reliance on the customer. Dhaliwal et al. (2016) have reported a positive relation between CC and a supplier's cost of debt because a more concentrated customer base increases a supplier's risk. Campello and Gao (2017) have suggested an extremely high level of profitability reduces the detrimental impact of CC on bank credit. Despite its positive impact on profitability, customer-based concentration is associated with higher loan markups. They have found that CC increased interest rate spreads and the number of restrictive covenants but reduced the maturity in new (or renewed) bank loans. Liu, Xiao, and Xie (2020) also found that higher customer concentration is associated with higher bond spreads, shorter bond maturity, and more bond covenants. They moreover found that the unfavorable association between CC and bond contract terms is weakened for firms operating within better institutions or for those whose ultimate owners are the Central Government of China. Na (2020) found similar evidence that higher CC could lead to higher yield spreads and strict covenants, firms having the US Government as a major customer pay lower yield spreads. However, Cohen et al. (2022) found no evidence of the existence of major government customers is related to the supplier firm's loan spread, security, or maturity. Cui et al. (2022) provided evidence that CC may increase operational efficiency, reduce information risk and default risk; which then reduce bank loan contracting costs.

Although these studies have investigated how a bank evaluated a firm's CC and supply-chain relations, none examined how investors reacted to the bank's evaluation of customer concentration-based borrowing firms by referring to the information content of bank loan announcements.

## **2.3 The uniqueness of bank loan**

Previous studies have shown that bank loans contain information about the borrower, and firms borrowing from banks enjoyed significantly positive abnormal returns upon the announcements of bank loan agreements. For example, Mikkelsen and Partch (1986) and James (1987) have found that firms borrowing from banks experienced positive abnormal returns upon the announcements of bank loans. Lummer and McConnell (1989) have observed that the abnormal response of stock return occurred for announcements of renegotiated loans but not for new loan announcements. Best and Zhang (1993) have shown that the benefits of loan agreements can be partially replaced by analysts following. Slovin, Johnson, and Glascock (1992) have noted that small firms benefit more from bank agreements than large firms, whereas Hadlock and James (2002) have demonstrated that undervalued firms incur higher abnormal returns from loan announcements. Gande and Saunders (2012) have provided evidence that loan announcement abnormal return persists even with the presence of the secondary loan market. These studies provide evidences that banks undertake ex-ante screening of borrowing firms; hence, the bank's decisions to enter into loan agreements provide information about the credit quality of the borrowers. Alternatively, some studies examine the benefits of bank loans for borrowers in the aftermath of the loan agreements. Specifically, banks are more efficient in monitoring the borrowing firms to alleviate debt-related agency problems after entering into loan agreements (Diamond 1984; Fama 1985; Gorton and Kahn 2000). Interestingly, Bailey, Huang, and Yang (2011) have suggested that bank loan approval implies borrower's poor subsequent performance; thus, bank loan announcements attract a negative response in China.

Although Bailey, Huang, and Yang (2011) have suggested that the special roles for banks are nonexistent in China by providing evidence of negative announcement abnormal return and

following poor performance, there is a lack of research associating bank loans with supply-chain finance and examining whether banks' special roles exist in terms of high CC borrower in China. In other words, banks' certification and monitoring of borrower's CC may alleviate the negative response to bank loan announcements in China. Conversely, banks' doubts of the borrower's CC may aggravate the negative announcement response in China. Additionally, previous studies only investigate the abnormal announcements return upon approved loan announcements while ignoring the rejected loan announcements. This paper aims to provide empirical evidence about the valuable information of borrowing firm's CC hidden in both approved and rejected bank loan announcements.

## 2.4 Hypothesis development

Though Bailey *et al.*'s (2011) study has suggested that, unlike developed countries, negative abnormal returns occurred upon bank loan announcements in China and a bank's special certification role in debt does not hold up in China's banking system, this study holds that bank's certification and monitoring of firm's CC have continued in China – a big manufacturing country, whose CC is strong and pervasive. Under the certification hypothesis, this study hypothesizes that firms with higher CC incur higher abnormal returns in approved loan announcements since investors perceive that the benefits of concentration outweigh the costs. Bank's willingness to invest in those firms indicates the true value of firms' CC, which is not observable to outside investors before the announcements. It is expected that the bank's certification of a firm's CC is immediately implemented around the date of approved bank loan announcement; thus, the short-term CAR significantly increase. Therefore, hypothesis H1a is developed:

**H1a:** *Firms with higher customer concentration are associated with positive abnormal returns upon approved loan announcements.*

Contrarily, the rejected bank loan announcements may send a poor signal about borrowers with higher CC since rejected loans may transmit negative information, that is, the bank does not think highly of the firm's high CC. In other words, after screening the borrowing firm's major customers and evaluating the benefits and risks of such CC for the firm, the bank decides not to release the loan to the firm. Hence, in terms of 'rejected' bank loan announcements, the bank can reduce the information asymmetry – about a firm's customer concentration – between the firm and its investors by implying that such CC tends to be risky, instead of beneficial, to the firm. This research proposes that firms with higher CC incur more negative returns upon loan announcements. Therefore, hypothesis H1b is developed as follows:

**H1b:** *Firms with higher customer concentration are associated with negative abnormal returns upon rejected loan announcements.*

Additionally, if the company's top five customers contain an SOC receiving support from the government and thus have a less unfavorable impact on the supplier, the borrowing firm is unlikely to go bankrupt. Consistently, some studies documented that governments provide guarantees for state-owned enterprises' financial strength and reputation. Goldman, Rocholl, and So (2013) argued that government customers had a relatively low bankruptcy risk. Dhaliwal *et al.* (2016) found that the relationship between CC and financing cost is less pronounced for suppliers with a concentrated base of safer government customers. This study proposes the positive relationship between CC and CAR in approved loans becomes stronger if the firm's top five customers contain a SOC because they can reduce the risk of a firm's CC. Conversely, despite the company's top five customers containing a SOC, the bank continues to be reluctant to offer a loan, implying that the other major customers, except the SOC, can pose a great risk to the supplier. Thus, this study proposes that the

negative relationship between CC and CAR in rejected loans becomes stronger if the firm owns a state-owned major customer. Therefore, hypothesis H2a is developed as follows:

**H2a:** *The relationship hypothesized in H1a or H1b is stronger if the borrowing firm owns a state-owned major customer.*

In addition, if the company's top customer is a listed enterprise, its strength is similar to that of the supplier, and the supplier is less likely to enjoy the bargaining power. Thus, the firm's CC tends to be a disadvantage instead of an advantage. This study proposes that the effect of a listed top customer leads to smaller CAR in both approved or rejected loans. Therefore, hypothesis H2b is developed as follows:

**H2b:** *The relationship hypothesized in H1a is weaker, while the relationship hypothesized in H1b is stronger if the borrowing firm's top customer is a listed enterprise.*

### 3 Research methodology

#### 3.1 Data and sample selection

The data used in this paper are obtained from China Stock Market Accounting Research (CSMAR) dataset. Listed companies are required by the China Securities Regulatory Commission to announce major events that may significantly affect their stock price. Thus, China A-share and B-share listed company bank loan announcements between 2002 and 2018 are identified using the CSMAR of the Bank Loan database. The bank loan announcement data are then divided into two types – approved and rejected loans – through the content of loan announcements. We classify bank loans as 'approved' loans if it is proclaimed that the company has obtained the loan, granted the credit, and signed a contract with the bank in its bank loan announcement; 'rejected' if the announcement only shows the company's intention to apply for loans, and it did not display an increase in short-term or long-term debt on the balance sheet in the announcement year. The CC from 2001 to 2017 from the CSMAR of the Top 5 Customers and Suppliers Information of the Notes to Financial Statements database are examined. The daily stock return and daily aggregated market return are then acquired from 2002 to 2018 using the CSMAR of Stock Market Trade database. Other relevant data, including basic financial statement information such as firm characteristics, are obtained from CSMAR of China Listed Firm's Basic Information and Financial Statements database. Any missing values are then filled in and corrected for any inaccurate information reported by CSMAR using companies' annual reports.

To minimize other confounding events, while investigating the abnormal returns upon bank loan announcement, bank loans whose announcement dates coincide with other corporate events are deleted, such as dividend announcements, mergers and acquisitions, chief executive officer turnover, and general meeting. Companies who have approved and rejected loan announcements simultaneously to avoid the noise are also omitted. Further, real estate companies, finance companies, public utilities, media, and culture companies are excluded from the sample. To mitigate the effects of outliers, all the firm-level variables are winsorized at the 1% level. The final sample consists of 3318 loan announcement observations (811 approved loan announcements and 2507 rejected loan announcements) for the 2002–2018 period.

#### 3.2 Measurement

##### 3.2.1 Customer concentration (CC)

Prior studies measure CC by calculating the basis of the percentage of sales that a firm assigns to its major customers (e.g. Banerjee, Dasgupta, and Kim 2008; Patatoukas 2012). Here, the first



measure – *Top 5 Customer Sales (TOP 5)* – is used to capture CC, which is defined as the sum of the percentage sales coming from the top five customers disclosed by the firm in its annual report. *TOP 5<sub>i</sub>* is computed as

$$TOP5_i = \sum_{j=1}^{n_i} \%Sales_{ij},$$

where  $n_i$  is the number of firm  $i$ 's top five customers and  $\%Sales_{ij} = \frac{\text{Sales of } i \text{ to } j}{\text{Total sales of } i}$  is the percentage of sales of firm  $i$  to major customer  $j$  over firm  $i$ 's total sales.

To ensure that our measurement of concentration is robust, the second measure – *Herfindahl Hirschman Index (HHI)* – is used, following Patatoukas (2012), to capture CC, which is defined as the sum of the squares of the percentage sales of the top five customers, to rerun the model (1).  $HHI_i$  is computed as

$$HHI_i = \sum_{j=1}^{n_i} \%Sales_{ij}^2,$$

where  $n_i$  is the number of firm  $i$ 's top five customers and  $\%Sales_{ij} = \frac{\text{Sales of } i \text{ to } j}{\text{Total sales of } i}$  is the percentage of sales from firm  $i$  to customer  $j$  over  $i$ 's total sales.

### 3.2.2 Market response: cumulative abnormal returns (CAR)

To highlight the special roles played by banks in the capital market when lending to a firm with high CC, the announcement-based abnormal returns are calculated following the standard estimation methodology for event studies with daily returns, as shown by Brown and Warner (1985). The estimation window is determined as  $(-250, -10]$ , with a total of 240 trading days. Specifically, the market model was estimated using daily stock returns in days  $-249$  through  $-10$ . The event window is set as  $[-1, +1]$ , with a total of three trading days. The daily abnormal return is the difference between the actual daily return and the daily return predicted by the market model using the estimated factor loadings from the regression results. The abnormal stock return for firm  $i$  over day  $t$  is defined as

$$AR_{it} = R_{it} - \left( \hat{\alpha}_i + \hat{\beta}_i * R_{mt} \right),$$

where  $R_{it}$  is the rate of return of firm  $i$  over period  $t$ ,  $R_{mt}$  is the rate of return on the CSMAR equal-weighted market index over period  $t$ , and  $\hat{\alpha}_i$  and  $\hat{\beta}_i$  are ordinary least squares (OLS) estimates of firm  $i$ 's market model parameters.

For each firm  $i$ , short-term announcement effects are estimated by cumulating the abnormal returns over a three-day interval  $[-1, +1]$ . The cumulative abnormal return for firm  $i$  over day  $t$  is defined as

$$CAR_i = \sum_{t=-1}^1 AR_{it},$$

where  $CAR_i$  is a cumulative three-day market equal-weighted abnormal return around the event date estimated based on the market model.

### 3.3 Customer concentration and cumulative abnormal return

Ordinary least squares (OLS) regression model is utilized to investigate the relationship between CC and CAR. OLS regression model is the most efficient linear regression estimator when the assumptions hold true. The assumptions of linearity in the coefficients, population mean of error terms equal zero, all independent variables are uncorrelated with the error term, error term are



uncorrelated with each other, error term has a constant variance (no heteroscedasticity), no independent variable is a perfect linear function of other explanatory variables, and the error term is normally distributed are validated by the residual analysis. The results of assumption tests are not given here but may be provided as needed. Another benefit of satisfying these assumptions is that as the sample size increases to infinity, the coefficient estimates converge on the actual population parameters. OLS regression model was used extensively in previous studies (Patatoukas 2012; Dhaliwal et al. 2016; Campello and Gao 2017; Hui, Liang, and Yeung 2019; Liu, Xiao, and Xie 2020; Cui et al. 2022; Cohen et al. 2022).

To test the *H1a* and *H1b*, we separate the samples into two groups – ‘approved’ and ‘rejected’ loan announcement samples – to run the following OLS regression model:

$$\begin{aligned} CAR_i = & \alpha_0 + \alpha_1 CC_i + \alpha_2 Amount_i + \alpha_3 Maturity_i + \alpha_4 Rate_i + \alpha_5 Big5_i + \alpha_6 Size_i + \alpha_7 ROE_i \\ & + \alpha_8 Age_i + \alpha_9 MB\ ratio_i + \alpha_{10} Leverage_i + \alpha_{11} Trading\ status_i + \alpha_{12} Market\ share_i \\ & + \alpha_{13} Beta_i + \varepsilon_i \end{aligned} \quad (1)$$

In model (1), *CAR* (Cumulative Abnormal Return) proxies for short-term announcement return. *CC* is *Top 5 Customer Sales* or *HHI*, proxying for *CC*. The control variables used in model (1) include *Amount*, *Maturity*, *Rate*, *Big5*, *Size*, *ROE*, *Age*, *MB ratio*, *Leverage*, *Trading status*, *Market share*, and *Beta*. *Amount* is loan amount scaled by the total asset. *Maturity* is the number of years between the start and termination dates in the bank loan agreement. Gong, Xu, and Gong (2018), Qi and Wald (2008) and Chava, Kumar, and Warga (2010) find that the amount of the bond (loan) and the bond (loan) maturity are significant determinants of bond (loan) covenant. *Rate* is an indicator, which is equal to 1 if the loan interest rate is disclosed in loan announcements, otherwise 0. Following Chuluun, Prevost, and Puthenpurackal (2014) and Tanaka (2016), corporate governance control variable should be added. We view reputed auditors as part of corporate governance mechanism and so an indicator *Big5* is added, which is equal to 1 if loaning bank is one of the Chinese Big5 banks, otherwise 0. *Size* is natural log of the total asset. Lang and Lundholm (1993) find evidence that larger firms generally have higher quality of accounting information and thus less information risk for the stakeholders. *ROE* is the ratio of net income to the total equity, which is used to control for profit. Campello and Gao (2017) show that the firms that are more profitable may prevent default and absorb losses, then control influence on the impact of customer concentration on interest rate spread. *Age* is the firm’s age calculated by event year minus the firm’s establishment year. Na (2020) document the firm’s age is one of the determinants of the terms of the loans. *MB ratio* proxies for growth options and is calculated as the ratio of market value to book value of equity. *Leverage* is total liabilities divided by the market value of equity. Graham, Li, and Qiu (2008) pointed out that market-to-book ratio represents an additional value over book assets and found evidence that firms with lower leverage ratio can require lower interest rate spread for their debts. The presence of covenants is found negatively related to firm size and positively related to the firm’s existing leverage ratio (Malitz 1986; Billett, King, and Mauer 2007), *MB ratio* and *Leverage* are thus chosen as the control variables. To control for some other firms’ characteristics, we suggest the following control variables *Trading status*, *Market share*, and *Beta* can be added in our OLS regression model. *Trading status* is an indicator, which is equal to 1 if trading status is normal transaction, otherwise 0. *Market share* is an indicator, which is equal to 1 if the firm’s sales are larger than industry sales median, otherwise 0. *Beta* is the firm’s beta estimated by using the market model in the estimation period.

This study posits a positive  $\alpha_1$  in the ‘approved’ group but negative in the ‘rejected’ group. It is believed that the effect of *CC* on *CAR* upon announcements increases with the increasing levels of information content of bank loan announcement.

**Table 1.** Summary Statistics.

Variable	No. of Obs.	Mean	SD	Min	Median	Max
CAR	3318	-0.002	0.048	-0.137	-0.003	0.132
CC	3318	0.279	0.167	0.081	0.229	0.611
(Top 5)						
CC (HHI)	2037	5.277	10.757	0.006	1.847	70.762
Amount	3318	0.047	0.067	0.000	0.025	0.452
Maturity	3318	1.464	1.416	0.500	1.000	10.000
Rate	3318	0.105	0.307	0.000	0.000	1.000
Big5	3318	0.341	0.474	0.000	0.000	1.000
Size	3318	22.188	1.011	20.641	22.118	23.832
ROE	3318	0.055	0.126	-0.662	0.067	0.308
Age	3318	14.771	6.092	3.000	15.000	29.000
MB ratio	3318	0.003	0.004	0.000	0.002	0.028
Leverage	3318	960.070	1207.598	34.878	497.366	6828.846
Trading	3318	0.913	0.282	0.000	1.000	1.000
status						
Market	3318	0.512	0.500	0.000	1.000	1.000
share						
$\beta$	3318	-0.305	0.325	-1.099	-0.322	0.366

This table presents descriptive statistics for all variables used in the main analysis.

**Table 2.** Summary Statistics of the Variables for Firms with Loan Rejections and Approvals.

Variable	Firms with Loan Rejection		Firms with Loan Approval	
	Mean	Mean	Difference in Means	t-statistics
CAR	-0.003	-0.001	-0.001	-0.745
CC	0.273	0.296	-0.024***	-3.509
(Top 5)				
Amount	0.048	0.043	0.005*	1.760
Maturity	1.278	2.038	-0.760***	-13.648
Rate	0.034	0.326	-0.292***	-25.771
Big5	0.300	0.470	-0.170***	-8.970
Size	22.287	21.883	0.405***	10.052
ROE	0.053	0.061	-0.008	-1.552
Age	15.589	12.243	3.346***	13.990
MB ratio	0.003	0.003	0.000***	3.177
Leverage	882.685	1199.287	-316.603***	-6.531
Trading	0.911	0.919	-0.008	-0.698
status				
Market	0.561	0.360	0.201***	10.112
share				
$\beta$	-0.350	-0.164	-0.186***	-14.634

This table presents the summary statistics of the variables for the group of firms with loan rejection and those with loan approval respectively; and the results of the between groups t-test for the difference in means of the variables between these two groups are reported. The number of observations in the group of firms with loan approval and loan rejection is 811 and 2507 respectively.

\*\*\* indicates statistical significance at 1%; \*\* indicates statistical significance at 5%; \* indicates statistical significance at 10%

### 3.4 The effect of customer nature

To test *H2a* and *H2b*, the 'approved' or 'rejected' loan announcement samples with disclosure of top five customers' names provided in the borrowing firm's annual reports are used to run the following OLS regression models:

**Table 3.** Pearson & Spearman Correlation – for all approved loan announcements.

	CAR	CC	Amount	Maturity	Rate	Big5	Size	ROE	Age	MB ratio	Leverage	Trading status	Market share	$\beta$
CAR	1	-0.01	0.01	-0.05	-0.00	-0.02	-0.08 <sup>b</sup>	0.03	-0.07 <sup>c</sup>	-0.08 <sup>b</sup>	0.05	-0.05	-0.09 <sup>b</sup>	0.12 <sup>a</sup>
CC	-0.02	1	0.19 <sup>a</sup>	0.09 <sup>b</sup>	0.23 <sup>a</sup>	0.10 <sup>a</sup>	-0.02	-0.07 <sup>c</sup>	-0.11 <sup>a</sup>	0.04	-0.07 <sup>b</sup>	0.04	-0.09 <sup>b</sup>	0.04
Amount	0.03	0.19 <sup>a</sup>	1	0.10 <sup>a</sup>	0.10 <sup>a</sup>	0.11 <sup>a</sup>	-0.52 <sup>a</sup>	-0.06 <sup>c</sup>	-0.28 <sup>a</sup>	0.14 <sup>a</sup>	-0.35 <sup>a</sup>	-0.03	-0.33 <sup>a</sup>	0.10 <sup>b</sup>
Maturity	-0.01	0.05	0.07 <sup>b</sup>	1	-0.09 <sup>b</sup>	0.06	0.26 <sup>a</sup>	-0.01	0.15 <sup>a</sup>	-0.01	-0.01	0.04	0.21 <sup>a</sup>	-0.12 <sup>a</sup>
Rate	-0.01	0.22 <sup>a</sup>	0.03	-0.12 <sup>a</sup>	1	0.02	-0.07 <sup>b</sup>	-0.08 <sup>b</sup>	-0.22 <sup>a</sup>	-0.04	-0.00	-0.19 <sup>a</sup>	-0.15 <sup>a</sup>	0.21 <sup>a</sup>
Big5	-0.02	0.10 <sup>a</sup>	0.04	0.07 <sup>b</sup>	0.02	1	-0.22 <sup>a</sup>	0.11 <sup>a</sup>	-0.33 <sup>a</sup>	-0.13 <sup>a</sup>	0.03	-0.15 <sup>a</sup>	-0.14 <sup>a</sup>	0.18 <sup>a</sup>
Size	-0.08 <sup>b</sup>	-0.03	-0.32 <sup>a</sup>	0.29 <sup>a</sup>	0.06 <sup>c</sup>	-0.23 <sup>a</sup>	1	0.03	0.43 <sup>a</sup>	-0.24 <sup>a</sup>	0.41 <sup>a</sup>	0.19 <sup>a</sup>	0.70 <sup>a</sup>	-0.26 <sup>a</sup>
ROE	0.01	-0.05	-0.03	0.04	-0.12 <sup>a</sup>	0.07 <sup>c</sup>	0.09 <sup>b</sup>	1	-0.17 <sup>a</sup>	0.01	-0.02	0.10 <sup>a</sup>	0.06 <sup>c</sup>	0.06 <sup>c</sup>
Age	-0.04	-0.09 <sup>b</sup>	-0.05	0.21 <sup>a</sup>	-0.21 <sup>a</sup>	-0.32 <sup>a</sup>	0.44 <sup>a</sup>	-0.07 <sup>b</sup>	1	0.27 <sup>a</sup>	-0.06 <sup>c</sup>	0.11 <sup>a</sup>	0.32 <sup>a</sup>	-0.50 <sup>a</sup>
MB ratio	0.06 <sup>c</sup>	0.14 <sup>a</sup>	0.31 <sup>a</sup>	-0.04	0.08 <sup>b</sup>	-0.11 <sup>a</sup>	-0.21 <sup>a</sup>	-0.24 <sup>a</sup>	0.27 <sup>a</sup>	1	-0.67 <sup>a</sup>	0.05	-0.22 <sup>a</sup>	-0.16 <sup>a</sup>
Leverage	0.05	-0.10 <sup>b</sup>	-0.15 <sup>a</sup>	-0.04	-0.05	0.00	0.29 <sup>a</sup>	0.02	-0.06 <sup>c</sup>	-0.27 <sup>a</sup>	1	-0.19 <sup>a</sup>	0.25 <sup>a</sup>	0.09 <sup>a</sup>
Trading status	-0.04	0.03	-0.05	0.04	-0.19 <sup>a</sup>	-0.15 <sup>a</sup>	0.17 <sup>a</sup>	0.24 <sup>a</sup>	0.11 <sup>a</sup>	-0.12 <sup>a</sup>	-0.25 <sup>a</sup>	1	0.19 <sup>a</sup>	-0.15 <sup>a</sup>
Market share	-0.07 <sup>b</sup>	-0.09 <sup>b</sup>	-0.25 <sup>a</sup>	0.19 <sup>a</sup>	-0.15 <sup>a</sup>	-0.14 <sup>a</sup>	0.70 <sup>a</sup>	0.10 <sup>a</sup>	0.31 <sup>a</sup>	-0.18 <sup>a</sup>	0.20 <sup>a</sup>	0.19 <sup>a</sup>	1	-0.29 <sup>a</sup>
$\beta$	0.08 <sup>b</sup>	0.03	0.02	-0.11 <sup>a</sup>	0.21 <sup>a</sup>	0.18 <sup>a</sup>	-0.24 <sup>a</sup>	-0.04	-0.49 <sup>a</sup>	-0.12 <sup>a</sup>	0.07 <sup>b</sup>	-0.15 <sup>a</sup>	-0.27 <sup>a</sup>	1

This table presents the Pearson & Spearman Correlation between all the variables used in the analysis for all approved loan announcements samples. a indicates statistical significance at the 0.01 level; b indicates statistical significance at the 0.05 level; c indicates statistical significance at the 0.1 level.

$$\begin{aligned}
CAR_i = & \alpha_0 + \alpha_1 CC_i + \alpha_2 SOC_i + \alpha_3 CC_i * SOC_i + \alpha_4 Amount_i + \alpha_5 Maturity_i + \alpha_6 Rate_i + \alpha_7 Big5_i \\
& + \alpha_8 Size_i + \alpha_9 ROE_i + \alpha_{10} Age_i + \alpha_{11} MB\ ratio_i + \alpha_{12} Leverage_i + \alpha_{13} Trading\ status_i \\
& + \alpha_{14} Market\ share_i + \alpha_{15} Beta_i + \varepsilon_i
\end{aligned}
\tag{2a}$$

$$\begin{aligned}
CAR_i = & \alpha_0 + \alpha_1 CC_i + \alpha_2 LC_i + \alpha_3 CC_i * LC_i + \alpha_4 Amount_i + \alpha_5 Maturity_i + \alpha_6 Rate_i + \alpha_7 Big5_i \\
& + \alpha_8 Size_i + \alpha_9 ROE_i + \alpha_{10} Age_i + \alpha_{11} MB\ ratio_i + \alpha_{12} Leverage_i + \alpha_{13} Trading\ status_i \\
& + \alpha_{14} Market\ share_i + \alpha_{15} Beta_i + \varepsilon_i
\end{aligned}
\tag{2b}$$

There are two additional control variables in Models (2a) and (2b): *SOC* and *LC*, respectively. *SOC* proxies for the nature of borrowers' ownership and is an indicator, which is equal to 1 if there is a state-owned enterprise among top five customers, otherwise 0. Chen (2017) find evidence that state-owned enterprises are usually treated differently on the opportunity of getting external finance. *LC* proxies for the listed customer and is an indicator, which is equal to 1 if the largest customer is a listed enterprise, otherwise 0.  $\alpha_3$  is expected to be positive in approved loan samples but negative in rejected loan samples in terms of stated-owned customer nature effect. however,  $\alpha_3$  may be negative in both approved and rejected loan samples in terms of listed customer nature effect.

## 4 Empirical results

### 4.1 Summary statistics and correlation analysis

Table 1 reports the summary statistics of the CAR, CC (Top 5/HHI), loan terms, and borrowing firms' characteristics in the study's sample. The final sample consists of 3318 bank loan announcements from 2002 to 2018. The mean of CAR for all loan announcements in the sample is  $-0.2\%$ , which is a negative cumulative abnormal return. This indirectly proves Bailey *et al.*'s (2011) study that negative abnormal returns occur upon bank loan announcements in China, but this cannot completely deny the special role of banks in China. Sampled firms attribute about 28% of their sales to major customers on average, while the largest Top Five Customer Sales even up to 61%.

Table 2 displays the summary statistics of the variables in different groups of firms with loan approval announcements and those with loan rejection announcements, respectively. A between-group t-test has been performed to examine whether there is a significant difference in the mean values of these variables. The results of the t-test show a significant difference in the mean values of the variables used in the analysis between these two groups. Among these variables, the mean of CAR in loan approval group is  $-0.1\%$ , which is consistent with the findings of Bailey, Huang, and Yang (2011). They have also suggested that bank loan approval announcements attract a negative response in China. However, they only investigated the abnormal announcements return upon approved loan announcements but not rejected loan announcements. Therefore, we doubt their conclusion that the banks do not play the role of certification and monitoring in China. Our study divides the bank loan announcement data into approved loan group and rejected loan group, and 'approved' loan announcements can be considered as 'with' bank's certification and monitoring while 'rejected' loan announcements can be considered as 'without' bank's certification and monitoring. As shown in the table, the mean of CAR in loan rejection group is  $-0.3\%$ , which is more negative than that in the approved group, although the difference is not significant. We further investigate the relationship between CAR and CC toward approved and rejected bank loan announcements, respectively, by OLS regression model in the following study, which shows significant difference between these two groups and proves the existence of a bank's uniqueness in certifying and monitoring a firm's CC in China. The mean of customer concentration between these two groups is significantly different, and the firms with approved loans have a higher CC.

Table 3 and Table 4 show the Pearson and Spearman correlations for approved and rejected loan announcements, respectively. This shows that CC is insignificantly correlated with CAR for approved loan announcements; however, CC is negatively and significantly correlated with CAR for rejected loan announcements, which is almost consistent with the latter regression analysis. This may imply that if the firms have higher CC, their failure to obtain the loan will have a strong negative impact on the abnormal returns. In other words, banks' doubts of the borrower's CC may aggravate the negative announcement response, but banks' certification and monitoring of borrower's CC may alleviate the negative announcement response in China.

#### 4.2 Customer concentration and cumulative abnormal return

Table 5 lists the results for model (1), which aims to test *H1a* and *H1b*. The results show that CC is significantly and negatively associated with CAR in the group of rejected loans but insignificantly and negatively associated with CAR in the group of approved loans, regardless of the measure of CC used. The correlation is statistically significant at the 0.01 and 0.05 level, respectively, using *Top 5 Customer Sales* and *HHI* as the measure of customer concentration. The empirical results support *H1b* but do not support *H1a*. Although *H1a* is not supported by the empirical results, the size of the regression coefficient of CC on CAR is less negative in the group of firms with loan approval announcements ( $-0.00591$ ) than that with loan rejection announcements ( $-0.0183$ ). This is because if banks are unwilling to lend money to firms with high CC after weighing benefits and risks, the loan announcements may send a negative signal to investors about the borrowing firm's customer concentration. This indicates that investors react negatively toward the borrowing firm's high CC upon the rejected loan announcements. As such high CC is suspected by the bank, and investors consider them risky. However, regarding firms that could acquire loans, the loan announcements send a slightly negative signal to investors. From the investors' perspective, high CC is not considered high risk due to the certification of the banks, but whether it is an advantage remains uncertain. Therefore, investors do not respond positively to the firm's high CC upon the approved loan announcements. That's why the empirical results do not support *H1a*. We can infer that investors tend to be conservative about high CC in China, and their concerns about CC risk can be reduced by banks' certification through the approved loan announcements. Therefore, the bank can play the role of a certifier of the borrower's CC in terms of loan approval; however, without the bank's certification of CC, the loan rejection transfers some adverse information about the borrower's CC to the market. In other words, the conclusion of banks' certification function is not drawn from the positive relationship between CAR and CC in approved loans but from the comparison of the empirical results in approved and rejected groups. The negative relationship between CAR and CC exists in loan rejection but does not exist in loan approval due to the bank certification of the firm's high customer concentration. Although Bailey, Huang, and Yang (2011)'s study presents evidence that investors respond negatively to bank loan announcements in China because of the prediction of the company's poor profitability, the existence of the bank's certification function in China is undeniable. Our study claims that banks' certification of a firm's CC is operational in China and the 'inside debt' theory can be demonstrated from the firm's CC perspective, which contributes to the literature of a bank's uniqueness in China's capital market and fills the research gap. Banks have access to detailed information of a firm's CC, which is unknown to investors; thus, investors can judge the risk of the firm's CC through bank loan announcements. The information asymmetry can be reduced by banks' certification or suspicion reflected in approved or rejected loan announcements.

#### 4.3 The effect of customer's nature

Table 6 presents the results of the regression model (2a), with SOC and CC\*SOC used in the second and third regressor, which is formed to test *H2a*. Clearly, the coefficient of interaction **CC\*SOC** is

**Table 4.** Pearson & Spearman Correlation – for all rejected loan announcements.

	CAR	CC	Amount	Maturity	Rate	Big5	Size	ROE	Age	MB ratio	Leverage	Trading status	Market share	β
CAR	1	<b>-0.01</b>	0.06 <sup>a</sup>	-0.05 <sup>a</sup>	0.04 <sup>b</sup>	-0.03	-0.10 <sup>a</sup>	-0.03 <sup>c</sup>	0.05 <sup>a</sup>	0.02	-0.09 <sup>a</sup>	-0.05 <sup>b</sup>	-0.06 <sup>a</sup>	-0.02
CC	<b>-0.04<sup>c</sup></b>	1	0.22 <sup>a</sup>	0.01	0.00	0.02	-0.29 <sup>a</sup>	-0.20 <sup>a</sup>	-0.00	0.02	-0.16 <sup>a</sup>	0.11 <sup>a</sup>	-0.29 <sup>a</sup>	-0.02
Amount	0.02	0.15 <sup>a</sup>	1	-0.00	-0.04 <sup>b</sup>	0.12 <sup>a</sup>	-0.48 <sup>a</sup>	-0.04 <sup>c</sup>	0.02	0.18 <sup>a</sup>	-0.39 <sup>a</sup>	0.13 <sup>a</sup>	-0.28 <sup>a</sup>	-0.07 <sup>a</sup>
Maturity	-0.01	0.01	0.02	1	-0.00	-0.02	0.09 <sup>a</sup>	0.00	0.05 <sup>b</sup>	-0.07 <sup>a</sup>	0.07 <sup>a</sup>	-0.10 <sup>a</sup>	0.02	-0.05 <sup>b</sup>
Rate	0.04 <sup>c</sup>	-0.00	-0.00	0.06 <sup>a</sup>	1	-0.08 <sup>a</sup>	-0.00	-0.00	0.02	-0.02	0.06 <sup>a</sup>	-0.10 <sup>a</sup>	-0.03	-0.02
Big5	-0.03	0.03	0.08 <sup>a</sup>	-0.02	-0.08 <sup>a</sup>	1	-0.08 <sup>a</sup>	0.02	-0.05 <sup>b</sup>	-0.03	-0.04 <sup>c</sup>	0.05 <sup>b</sup>	-0.04 <sup>b</sup>	0.03
Size	-0.10 <sup>a</sup>	-0.24 <sup>a</sup>	-0.32 <sup>a</sup>	0.09 <sup>a</sup>	0.00	-0.08 <sup>a</sup>	1	0.15 <sup>a</sup>	0.11 <sup>a</sup>	-0.33 <sup>a</sup>	0.62 <sup>a</sup>	-0.20 <sup>a</sup>	0.70 <sup>a</sup>	0.07 <sup>a</sup>
ROE	-0.07 <sup>a</sup>	-0.09 <sup>a</sup>	-0.01	-0.01	-0.04 <sup>b</sup>	0.01	0.04 <sup>b</sup>	1	-0.04 <sup>c</sup>	0.12 <sup>a</sup>	-0.08 <sup>a</sup>	-0.09 <sup>a</sup>	0.23 <sup>a</sup>	0.11 <sup>a</sup>
Age	0.03	-0.03	0.07 <sup>a</sup>	0.05 <sup>b</sup>	0.02	-0.05 <sup>b</sup>	0.08 <sup>a</sup>	0.02	1	-0.09 <sup>a</sup>	0.03 <sup>c</sup>	-0.03	0.14 <sup>a</sup>	-0.18 <sup>a</sup>
MB ratio	0.07 <sup>a</sup>	0.03	0.16 <sup>a</sup>	-0.04 <sup>c</sup>	0.07 <sup>a</sup>	-0.04 <sup>b</sup>	-0.27 <sup>a</sup>	-0.08 <sup>a</sup>	0.03 <sup>c</sup>	1	-0.58 <sup>a</sup>	0.02	-0.27 <sup>a</sup>	0.00
Leverage	-0.07 <sup>a</sup>	-0.10 <sup>a</sup>	-0.20 <sup>a</sup>	0.11 <sup>a</sup>	0.05 <sup>b</sup>	0.00	0.51 <sup>a</sup>	-0.25 <sup>a</sup>	0.06 <sup>a</sup>	-0.26 <sup>a</sup>	1	-0.27 <sup>a</sup>	0.43 <sup>a</sup>	0.04 <sup>b</sup>
Trading status	-0.05 <sup>a</sup>	0.10 <sup>a</sup>	0.07 <sup>a</sup>	-0.09 <sup>a</sup>	-0.10 <sup>a</sup>	0.05 <sup>b</sup>	-0.19 <sup>a</sup>	0.01	-0.03 <sup>c</sup>	-0.06 <sup>a</sup>	-0.20 <sup>a</sup>	1	-0.09 <sup>a</sup>	-0.02
Market share	-0.07 <sup>a</sup>	-0.24 <sup>a</sup>	-0.19 <sup>a</sup>	0.01	-0.03	-0.04 <sup>b</sup>	0.68 <sup>a</sup>	0.11 <sup>a</sup>	0.13 <sup>a</sup>	-0.22 <sup>a</sup>	0.31 <sup>a</sup>	-0.09 <sup>a</sup>	1	0.05 <sup>b</sup>
β	0.02	0.00	-0.07 <sup>a</sup>	-0.03	-0.01	0.03	0.07 <sup>a</sup>	0.04 <sup>c</sup>	-0.19 <sup>a</sup>	0.04 <sup>c</sup>	-0.00	-0.02	0.04 <sup>c</sup>	1

This table presents the Pearson & Spearman Correlation between all the variables used in the analysis for all rejected loan announcements samples.

<sup>a</sup>indicates statistical significance at the 0.01 level;

<sup>b</sup>indicates statistical significance at the 0.05 level; <sup>c</sup> indicates statistical significance at the 0.1 level.

**Table 5.** Customer Concentration and Cumulative Abnormal Return.

CAR	Customer Concentration measured by Top 5 Customer Sales		Customer Concentration measured by HHI	
	Approved Loan	Rejected Loan	Approved Loan	Rejected Loan
<b>CC</b>	<b>-0.00591</b> <b>(0.0101)</b>	<b>-0.0183***</b> <b>(0.00640)</b>	<b>-0.000321</b> <b>(0.000254)</b>	<b>-0.000319**</b> <b>(0.000129)</b>
Amount	-0.00914 (0.0233)	-0.0103 (0.0154)	-0.00202 (0.0334)	-0.0174 (0.0169)
Maturity	0.000679 (0.000762)	-0.000164 (0.00107)	0.00170 (0.00115)	0.000196 (0.00115)
Rate	-0.00262 (0.00364)	0.00704 (0.00518)	0.00951 (0.00700)	0.00116 (0.00739)
Big5	-0.00914 (0.0233)	-0.0103 (0.0154)	3.45e-06 (2.42e-06)	-3.99e-06*** (1.30e-06)
Size	0.000679 (0.000762)	-0.000164 (0.00107)	-0.00959 (0.0158)	-0.00849* (0.00487)
ROE	-0.00262 (0.00364)	0.00704 (0.00518)	0.0106 (0.00844)	0.000505 (0.00346)
Age	-0.00434 (0.00353)	-0.00306 (0.00215)	0.0200** (0.00903)	-0.000292 (0.00418)
MB ratio	-0.00305 (0.00236)	-0.00488*** (0.00170)	0.149 (0.0912)	0.110** (0.0445)
Leverage	3.02e-06** (1.35e-06)	-2.98e-06*** (1.00e-06)	-0.000321 (0.000254)	-0.000319** (0.000129)
Trading status	-0.000497 (0.00464)	-0.0126*** (0.00309)	-0.00202 (0.0334)	-0.0174 (0.0169)
Market share	-0.00208 (0.00446)	-0.000189 (0.00284)	0.00170 (0.00115)	0.000196 (0.00115)
$\beta$	0.0101* (0.00608)	0.00540 (0.00330)	0.00951 (0.00700)	0.00116 (0.00739)
Constant	0.0668 (0.0491)	0.125*** (0.0376)	-0.00956* (0.00565)	-0.00241 (0.00270)
Observations	811	2,507	314	1,723
R-squared	0.025	0.032	0.067	0.042

This table presents regression results of model (1a) used to evaluate the effect of customer concentration on announcement cumulative abnormal returns in terms of approved and rejected loan announcements, respectively. The results are based on the pooled ordinary least squares regressions. The numbers in parentheses are standard errors of regression coefficients.

\*\*\* indicates statistical significance at the 0.01 level; \*\* indicates statistical significance at the 0.05 level; \* indicates statistical significance at the 0.1 level.

negative and significant in the group of rejected loans regardless of the kind of customer concentration measure ( $-0.186$  at 0.01 significance level and  $-0.00168$  at 0.1 significance level), but positive and significant in the group of approved loans only with Top 5 customer concentration measure ( $0.260$  at 0.05 significance level), which is almost consistent with *H2a*. This shows that the existence of a state-owned major customer decreases the CAR upon rejected loan announcements. State-owned enterprise usually has a stronger ability to resist sudden financial crises because they enjoy government support. The presence of a state-owned major customer implies that customers' bankruptcy risk may not substantially be transferred to suppliers; hence, CC's risks to suppliers should be lower than those without a state-owned major customer. Goldman, Rocholl, and So (2013) also find that government customers have a relatively low bankruptcy risk. Even so, the banks continue to provide loan rejection because they find other major customers of the company except the state-owned ones cause a great risk. This implies that the investors are more skeptical about the firm's CC in the rejected loan if the borrowing firm owns a state-owned major customer. In addition, the existence of a state-owned major customer may increase the CAR upon approved loan announcements because investors consider loan approval as a certification of the advantage of state-owned major customer to borrowing firm, although this conclusion is not that robust.



**Table 6.** The Effect of Customer Nature.

CAR	Top 5 Customer Sales		HHI	
	Approved Loan	Rejected Loan	Approved Loan	Rejected Loan
CC	-0.222*** (0.0822)	0.0570* (0.0294)	-0.00965** (0.00385)	0.000699 (0.000854)
SOC	-0.0130 (0.0355)	0.0467* (0.0255)	0.0593** (0.0224)	-0.00782 (0.0119)
<b>CC*SOC</b>	<b>0.260**</b> <b>(0.115)</b>	<b>-0.186***</b> <b>(0.0530)</b>	<b>0.00247</b> <b>(0.00228)</b>	<b>-0.00168*</b> <b>(0.000902)</b>
Amount	0.0117 (0.175)	-0.0202 (0.0453)	0.0954 (0.193)	-0.0393 (0.0432)
Maturity	0.00983** (0.00389)	0.00475 (0.00356)	0.0108** (0.00443)	0.00445 (0.00387)
Rate	0.0589** (0.0242)	0.0119 (0.0134)	0.0619*** (0.0228)	0.0189 (0.0156)
Big5	4.60e-05** (1.95e-05)	1.02e-05 (6.25e-06)	6.23e-05*** (2.22e-05)	7.50e-06 (6.08e-06)
Size	0.0114 (0.0247)	0.0173* (0.0102)	0.0196 (0.0270)	0.0180* (0.0103)
ROE	-0.0654** (0.0292)	0.00117 (0.0100)	-0.0723** (0.0316)	-0.00475 (0.0108)
Age	-0.0440 (0.0313)	0.0317** (0.0148)	-0.0484 (0.0322)	0.0284* (0.0152)
MB ratio	-0.959* (0.538)	-0.0299 (0.112)	-1.042* (0.553)	-0.0731 (0.124)
Leverage	-0.222*** (0.0822)	0.0570* (0.0294)	-0.00965** (0.00385)	0.000699 (0.000854)
Trading status	-0.0130 (0.0355)	0.0467* (0.0255)	0.0593** (0.0224)	-0.00782 (0.0119)
Market share	0.260** (0.115)	-0.186*** (0.0530)	0.00247 (0.00228)	-0.00168* (0.000902)
$\beta$	0.0117 (0.175)	-0.0202 (0.0453)	0.0954 (0.193)	-0.0393 (0.0432)
Constant	0.00983** (0.00389)	0.00475 (0.00356)	0.0108** (0.00443)	0.00445 (0.00387)
Observations	61	225	61	225
R-squared	0.507	0.267	0.476	0.239

This table presents the regression results of model (2a) to evaluate how the nature of state-owned customer affects the effect of customer concentration on announcement abnormal returns in terms of approved and rejected loan announcements, respectively. The results are based on the pooled ordinary least squares regressions. The numbers in parentheses are standard errors of regression coefficients.

\*\*\* indicates statistical significance at the 0.01 level; \*\* indicates statistical significance at the 0.05 level; \* indicates statistical significance at the 0.1 level.

Table 7 shows the results of model (2b) with *LC* and *CC\*LC* used as two of the regressors for testing *H2b*. We can see the interaction *CC\*LC* is significantly and negatively associated with CAR only in rejected loans regardless of the kind of customer concentration measure (-0.155 at 0.01 significance level and -0.00140 at 0.01 significance level), which is almost consistent with *H2b*. The listed company has a relatively strong comprehensive ability and bargaining power, so the listed major customer is unfavorable to the loan supplier, and, thus, such CC is relatively risky. This aggravates investors' negative reactions toward the firm's CC in rejected loan announcements. However, the listed top customer nature does not influence investor reactions toward the firm's CC in approved loans. This implies that the investors of listed companies concern more about the firm's CC in the rejected loans if the borrowing firm owns a listed major customer.

The results of Tables 5 and 6 jointly show that investors perceive bank loan rejection to have more incremental information regarding the nature of the major customer for a firm with high CC. Investors do not care about the firm's major customer nature in approved loan announcements as the banks have already certified the quality of borrowing firm's CC; however, investors will wonder

**Table 7.** The Effect of Customer Nature.

CAR	Top 5 Customer Sales		HHI	
	Approved Loan	Rejected Loan	Approved Loan	Rejected Loan
CC	-0.0380 (0.0296)	0.0279** (0.0122)	-0.000127 (0.000391)	0.000287 (0.000195)
LC	0.00948 (0.0237)	0.0462** (0.0196)	0.0259 (0.0160)	-0.000209 (0.00857)
<b>CC*LC</b>	<b>0.0516</b> <b>(0.0604)</b>	<b>-0.155***</b> <b>(0.0380)</b>	<b>-0.000158</b> <b>(0.00138)</b>	<b>-0.00140***</b> <b>(0.000297)</b>
Amount	0.0144 (0.0480)	-0.0222 (0.0203)	0.00304 (0.0501)	-0.0303 (0.0199)
Maturity	0.00220 (0.00182)	0.00118 (0.00136)	0.00224 (0.00188)	0.00112 (0.00142)
Rate	0.0120 (0.00983)	0.00351 (0.00753)	0.0118 (0.00970)	0.00326 (0.00797)
Big5	6.59e-06 (5.07e-06)	-1.13e-06 (1.91e-06)	6.58e-06 (4.71e-06)	-2.00e-06 (1.89e-06)
Size	0.00114 (0.0186)	-0.0205*** (0.00590)	-0.00239 (0.0181)	-0.0197*** (0.00586)
ROE	0.00164 (0.0112)	0.000689 (0.00454)	0.000901 (0.0115)	-0.00340 (0.00477)
Age	0.0131 (0.0164)	0.00352 (0.00602)	0.0126 (0.0165)	0.00242 (0.00610)
MB ratio	-0.0131 (0.142)	0.124** (0.0554)	0.0285 (0.141)	0.102* (0.0573)
Leverage	-0.0380 (0.0296)	0.0279** (0.0122)	-0.000127 (0.000391)	0.000287 (0.000195)
Trading status	0.00948 (0.0237)	0.0462** (0.0196)	0.0259 (0.0160)	-0.000209 (0.00857)
Market share	0.0516 (0.0604)	-0.155*** (0.0380)	-0.000158 (0.00138)	-0.00140*** (0.000297)
$\beta$	0.0144 (0.0480)	-0.0222 (0.0203)	0.00304 (0.0501)	-0.0303 (0.0199)
Constant	0.00220 (0.00182)	0.00118 (0.00136)	0.00224 (0.00188)	0.00112 (0.00142)
Observations	170	661	170	661
R-squared	0.113	0.134	0.102	0.127

This table presents the regression results of model (2b) to evaluate how the nature of listed company affect the effect of customer concentration on the announcement abnormal returns in terms of approved and rejected loan announcements, respectively. The results are based on the pooled ordinary least squares regressions. The numbers in parentheses are standard errors of regression coefficients.

\*\*\* indicates statistical significance at the 0.01 level; \*\* indicates statistical significance at the 0.05 level; \* indicates statistical significance at the 0.1 level.

why the bank is reluctant to lend to the firm, leading them to study the nature of the firm's major customer to seek an explanation. If the firm's top customer is a listed company or there is a state-owned enterprise among its top five customers, the negative relationship between CC and CAR in rejected loan announcements becomes stronger because investors perceive the firm's customer concentration to be riskier without the bank's certification.

## 5 Conclusion

Using either approved or rejected bank loan announcements for Chinese-listed firms between 2002 and 2018, this study investigates the relationship between the borrowing firm's customer concentration and cumulative abnormal returns of stocks by OLS regression model. The results show that firms with higher CC incur a significantly negative announcement abnormal returns for rejected loans but not for approved loans. Although the positive relationship between CC and announcement abnormal returns cannot be supported by empirical study, the comparison of approved and rejected group still can reflect the existence of bank's certification of firm's CC. The banks transmit

obvious negative signals about firms' high CC if the loans are rejected, while pass slight negative signals if the loans are approved. This indicates that banks' certification of the borrower's CC in approved loans may alleviate the investors' negative response to high CC, but banks' doubts in rejected loans increase the investors' negative response to high CC in China. Another explanation for the empirical evidence is that a bank loan approval is considered as a noisy signal for the characteristics of major customers for firms with a high CC in China, whereas a loan rejection is a much cleaner signal for the low quality of major customers.

Interestingly, the announcement abnormal returns are weaker upon rejected loan announcements if the borrowing firm owns a state-owned major customer or a listed top customer, providing evidence that customer nature can affect the degree of investors' negative reaction to the firm's CC in rejected loans. The stated-owned customer can attain the government support, which should be the advantage of the borrowing firm, whereas this still cannot stop banks to reject loan because other major customer except stated-owned customer can cause great disadvantage to the borrowing firm. The listed major customer is detrimental to the borrowing firm because listed customer may possess strong bargaining power relative to the supplier. Overall, firm's stated-owned and listed customer nature leads investors react more negatively to rejected loan announcements; however, bank's certification of firm's high CC in approved loan is basically reliable to investors so they do not care so much about borrowing firm's customer nature.

This study contributes to the literature of a bank's uniqueness in China's capital market by illustrating how the market investors evaluate the true value of firms' CC by referring to the bank's loan approval or rejection decision in its loan announcements. This demonstrates that banks play a certification and monitoring role in the borrowing firm's CC in approved loans. In addition, this study is the first to divide the bank loan announcement data into two types – approved loans and rejected loans – to investigate investors' reactions toward the bank loan announcements. Previous studies investigated the abnormal announcements return upon approved loan announcements but ignored the rejected loan announcements. However, in this study, 'approved' loan announcements represent 'with' bank's certification and monitoring, while 'rejected' loan announcements represent 'without' bank's certification and monitoring. This helps examine the cumulative abnormal return upon these two types of loan announcements, which can strengthen the existence of a bank's uniqueness in certifying and monitoring a firm's CC. Moreover, increasing levels of concentration and integration in the current business environment mark the importance in understanding the trade-offs associated with customer concentration, so this study also provides practical implications. A firm may use the certification role of banks to attract major customers to integrate resources with it and make proprietary investments on it. Also, a firm may take advantage of the monitoring role of banks to strengthen their bargaining power, restrict major customers, and reduce dependence on them.

Besides, this study only focuses on short-term cumulative abnormal returns upon loan announcements, excluding long-term accounting performance in one to three years after loan. Bank's certification of a firm's customer concentration takes effect immediately around the approved bank loan announcement date but bank's monitoring of a firm's customer concentration actually takes effect gradually after the approved bank loan announcement date. This limitation provides directions for future research. We will further investigate whether customer concentration-based firms show a better long-term accounting performance after loan to prove the bank's special role of monitoring in the capital market. On one hand, customer concentration-based firms can attain stable and long-lasting income, achieve resource integration, and improve long-term accounting performance. On the other hand, the long cycle of accounts receivable due to the trade credit to major customers can greatly reduce firms' cash flow, which may imply serious financial problems. Under the monitoring hypothesis, we hypothesize that the accounting performance of the borrower will become better after entering into this bank loan since banks may strengthen the

monitoring to the borrower such as restricting company from refinancing and offering trade credit to customers to protect their rights and interests.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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Variable	Description
CAR	cumulative abnormal return, proxies for short-term announcement abnormal returns
CC	Top 5 customer sales (Top 5) or Herfindahl Hirschman Index (HHI), proxies for customer concentration
SOC	proxies for the state-owned customer and is equal to 1 if there is a state-owned enterprise among top 5 customers, otherwise 0
LC	proxies for the listed customer and is equal to 1 if the largest customer is a listed enterprise, otherwise 0
Amount	loan amount scaled by the total asset
Maturity	number of years between start and termination dates in the bank loan agreement
Rate	1 if the loan interest rate is disclosed in loan announcements, otherwise 0
Big5	is equal to 1 if loaning bank is one of the Chinese Big5 bank, otherwise 0
Size	natural log of the asset
ROE	the ratio of net income to the total equity
Age	event year minus the firm's establishment year, proxies for firm's age
MB ratio	proxies for growth options and is calculated as the ratio of market value to book value of equity, a firm with the high market to book ratio indicates this firm has high growth potential
Leverage	total liabilities divided by the market value of equity
Trading status	is equal to 1 if trading status is normal transaction, otherwise 0
Market share	is equal to 1 if firm's sales are larger than industry sales median, otherwise 0
$\beta$	firm's beta estimated by using the market model in the estimation period

## Appendix

### Variable definition