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Bank Loan Supply and Corporate Capital Structure: Recent Evidence from China

Abstract:

This paper provides new evidence of supply side effects on corporate capital structure in China. We find that bank-dependent firms, that are large and state-owned companies in China, increase (decrease) their leverage ratios if loan supplies increase (decrease) relative to small and private firms due to their ability to access bank loans. With ability to substitute different forms of capital sources, large and state-owned firms are relatively less (more) likely to use internal funds and equity financing when bank loans are (not) available than small and private firms. During credit boom in 2009 and 2010, the large and state-owned firms increase leverage ratios by 2.26% and 2.76% more than matching firms; and small and private firms are shown to decrease leverage in this period. These findings lend support to the importance of supply side effects and bank loan segmentation on capital structure decisions.

JEL Classifications: G21; G32;

Keywords:

Bank loan supply; access to bank loans; corporate leverage; financing choice; loan financing

Bank Loan Supply and Corporate Capital Structure: Recent Evidence from China

1. Introduction

The finance literature indicates that market frictions and the types of available capital influence a firm's capital structure. Faulkender and Petersen (2006) indicate that firms with access to public bond market have significantly higher leverage than the firms without such access. Sufi (2007) finds that the introduction of bank loan rating allows the firms with lower credit quality to access to public debt market and increase the use of debt. Higher leverages are also found in the firms with traded CDS contracts that reduce the market friction in debt market (Saretto and Tookes, 2013). The supply of external capital also helps to determine corporate leverage. Some studies show that exogenous shocks on the supply of capital have varying impacts on capital structure, which depend on firms' abilities to raise capital, e.g., investment-grade vs. noninvestment-grade firms, large vs. small firms, and firms with more matured debts vs. firms with less matured debts (Leary, 2009; Almeida et. al., 2009; Erel et. al., 2012). The ability to use different forms of external financing and substitution among them are found to affect bank borrowings and corporate investment in credit contractions (Kashyap, Stein and Wilcox, 1993; Becker and Ivashina, 2014). These studies are related to a new strand of corporate finance literature, that demonstrates that the supply of capital, debt or loans, as well as the factors from the demand side, determines corporate capital structure, due to market segmentation or frictions in substituting multiple sources of capital (see the review in Graham and Leary (2011)).

Kahle and Stulz (2013) explore the impacts of supply (lending or credit) shock and demand shock on corporate policies in 2007 credit crisis. The supply shock channels indicate that the firms that rely on bank loan or credit would have to reduce debt issuance and capital expenditure during the 2007 credit crisis because the crisis results in a credit contraction.

Inconsistent with prior literature, they show that bank-dependent firms do not have more decreases in net debt issuance or capital expenditure, which question the role of bank lending supply in corporate policies. The possible reasons could be that the bank loans have become less important funding source and firms may have multiple methods to obtain financing other than loans in US.

Whether the lending/credit supplies determine capital structure is still debatable. In this study, we examine this question in the emerging capital market of China for several reasons. First, the banking system in China is often the sole and most important external financing source for companies, as non-bank financings are relatively rare due to the immature capital market. Equity issues (as well as bond issues) are subject to strict quotas set by the regulator, the China Securities Regulatory Commission (the CSRC), and in some years the quota is zero thus closing down the IPO market and even the market for secondary offerings. Second, the banking system is controlled by the government and is used as a policy tool for addressing national and social priorities. Furthermore, access to credit may be determined by political considerations and connections rather than determined on a commercial basis. Many studies show that big and state-owned firms have priority to access to bank loan (a recent observation is from Martin (2012)); while small and private firms are restricted to access to bank loan. The market segmentations in China provide opportunities to observe how the shock in bank loan supply, as supply side factor, affects corporate capital structure of different firms depending on their access to bank financing. Third, monetary policy and bank loan supply are frequently adopted to stimulate economic growth in emerging countries. A recent phenomenon is the significant credit growth since 2008 in large emerging markets like India, China, Turkey and Brazil (Onaran, 2013). In China, the supply of bank loans substantially increased in 2009 and 2010 following an expansionary monetary policy. The consequences of bank loan supply shock on corporate financial policies in different groups of firms are

unknown. For these reasons, we believe that the evidences from emerging markets can make contribution to current corporate finance literature in bank lending shock.

In this paper, we explore the role of bank lending shock as supply side effect in capital structure among different groups of firms in China. Our study has several objectives. First, we investigate the impacts of loan supply shocks on the leverage ratios of listed Chinese firms that have ability to access to bank loan or have been restricted to loans. Second, since the bank loan is the most important external financing and some firms are able to use such capital, we study the substitutions from internal funds/equity financing to bank financing due to changes in the bank loan supply in China's listed companies. Third, similar to the studies on 2007 credit crisis (for example, Kahle and Stulz, 2013), we use a special event/period, the credit boom from the last quarter of 2008 to 2010, to examine the importance of access to bank loan and the lending supply shock.

From prior literature, the intuitions behind the view of supply side effect are follows. First, there are some firms that are restricted to public debt market due to information asymmetry or others, and have to rely more on bank lending/credit (impaired access to capital and bank-dependent). Second, these companies, normally small or unrated firms (Leary, 2009; Kahle and Stulz, 2013), are unable to substitute bank lending from other external financing sources. Thus if bank loan supply increases (decreases), they will obtain more (less) loans and increase (decrease) leverages. In the contrary, large firms and firms with higher credit quality or credit ratings are not sensitive to bank loan supply because they can use other external funds if bank loan supply is not available. Unlike the studies in US context, our groups of bank-dependent firms are not the firms with impaired access to capital market or small firms. In this paper, the "bank-dependent" firms are large firms and state-owned firms, as state-owned banks have preferential treatment on these firms. These firms have advantage to access to bank loan. Small and private (not owned by state) firms are the groups of firms

that have impaired access to bank loan (capital in China's market). Similar to the logics in previous studies in US, we expect that bank lending shock would generate more impacts on bank-dependent firms (large and state-owned firms in this study) than the firms with impaired access to loan (small and private firms).

The findings in this paper can be summarized as follows. First, large and state-owned firms have a larger (smaller) increase in corporate leverage when bank loans are expanded (contracted) than small and private firms. The reason is that these firms can access to bank loan and rely more on bank loan. Small and private firms are restricted to loan market and thus not sensitive to bank supply shock. Our findings are opposite to the findings of Leary (2009) that large U.S. firms are less bank-dependent because of the availability of public debt whereas in our study, large firms in China are more bank-dependent and bank loans are the most important external source of financing. The difference in findings may be due to different market segmentations as a large U.S. (small) firm is able (unable) to substitute bank loans with public debt and in China large (small) firm is able (unable) to substitute internal funds/equity financing with bank loans. Second, we test the financing choice and the substitute between internal funds, bank loans and equity financing. We find that large and state-owned firms tend to use less (more) internal funds and equity financing when bank loan supply increases (decreases) than small and private firms. This is due to the preferential treatment given to large and state-owned firms in China's banking system, which allows these firms to rely less on internal funds and equity financing. Small and state-owned firms, however, cannot substitute other financings by bank loans. Third, using the event of credit boom between 2008Q4 and 2010Q4 in China, we find that large and state-owned firms increase leverage ratios by 2.26% and 2.76% more than matching firms during the credit boom periods. The leverage ratios decrease more in small and private firms than matching firms. State-owned firms are found to receive more bank loans by 1.94% (quarterly basis)

than matching firms.

This paper makes several contributions to the current literature. First, it supports the predictions of supply side impacts on capital structure in a developing country. Unlike US corporations that have the flexibility to switch among different forms of external financing, China's listed companies with access to bank loans significantly increase corporate leverage when loan supply increases. Second, our paper is the first paper to explore the impacts of bank loan supply and access to bank loans on financing choices between internal funds and external financing in China. We find that an increase in bank loan supply reduces the probability of using internal funds in large and state-owned companies, which supports the supply side effects of bank financing. Finally, our empirical findings support the claims in the report on China's banking system from the Congressional Research Service that China's banks give preferential treatment in lending to selected companies, usually large, state-owned and historically served firms (Martin, 2012). The stimulus program from late 2008 lends more support to these companies than to small and medium firms, despite the government's avowed intent to help small and medium sized firms.

This paper is structured as follows. The next section presents the literature review and, and gives a background on credit expansion in China. The third section introduces the hypotheses development, data, variables and methodologies. Empirical results and associated discussions are presented in section 4. The final section concludes the paper.

2. Background, Literature Review and Hypotheses Development

2.1 Institutional Background

The banking system in China has experienced significant reforms since 1978. A recent reform from 2003¹ is to transform previous state-owned banks into listed, joint-stock and

¹ In 2003, the China Banking Regulatory Commission (CBRC) was established to oversee China's banks and promote the reforms in the banking system.

competitive commercial entities. Five major commercial banks in China have been listed in Hong Kong and mainland China exchanges starting from 2005². There are several important characteristics of China's banks: first, state ownership is still large in these five major banks; second, the CEOs and directors in these banks are still assigned by the central government; and third, the central bank in China can regulate the operations, loans supply and services of these banks through multiple channels and determine the quotas and interest rate of lending. There is an ongoing debate on whether the banks should continue to be used to implement policies set by central government or whether they should operate based on commercial principles (Martin, 2012).

The central bank in China, the People's Bank of China (PBC), can employ many instruments to impact banks' practices. The PBC sets the direction of monetary policy and adopts instruments to increase or decrease bank loans. We use the stimulus program starting from 2008 Quarter Four to show how monetary policy influences bank loans in China. The central government shifted the monetary policy from a *moderately tight* level to a *moderately loose* level, following by several instruments to boost bank loan supply³ between the end of 2008 and 2010. The loose monetary policy effectively increases money and credit supply. The growth of bank loans and money supply can be easily observed from macroeconomic data. Figure 1, shows that the money supply (M2) and bank credit increases suddenly in 2008Q4. The trend of high loan and M2 growth lasts to the fourth quarter of 2010 when the government turned monetary policy from "a moderately loose monetary policy" to "a prudent monetary policy" (PBC, 2008). After that, the loan growth rate falls below the average level. The same pattern can also be found in the ratios of M2/GDP and Loan/GDP. Basically, we

² These banks are The Agricultural Bank of China, Bank of China, China Construction Bank, Industrial and Commercial Bank of China, and the Bank of Communications. They listed on the exchanges in 2010, 2006, 2005, 2006, and 2005, respectively.

³ The details of instruments can be found in China Monetary Report Quarter Four, 2008.

can conclude that the money supply and bank loans substantially increase during the stimulus period 2008Q4-2010Q4 due to the expansionary policy by PBC.

[Insert Figure 1 Here]

In addition to deciding bank loan supply, the central bank also gives some guidance on lending practices. In the 2008 Q4, the PBC states its monetary policy as “to guide financial institutions to increase credit lending to agriculture, rural areas, and farmers, *small- and medium-sized enterprises*, and post-disaster reconstruction on a preferential basis” (PBC, 2008). The China Banking Regulatory Commission put pressure on banks to require them to allocate loans to small- and medium-sized enterprises. However, according to the interviews by Congressional Research Service of US, “the banks perceive their past creditors more favorably than new creditors, and the banks have a tendency to provide loans to the larger, well-established state-owned and private corporations” (Page 21, Martin, 2012, p.21).

The credit boom may affect the capital structure of firms in China; however, the impacts are not clear. Some reports show that only 10 percent of the massive increased bank lending flowed to smaller firms (Leow, 2009; The Economist, 2009). Yet Lardy (2012) argued that at the aggregate bank lending level, household businesses, small size, and medium size firms can obtain more loans than large firms in 2009 and 2010; and the growths of loans to small and medium firms are much higher than the growth in lending to large firms (See Figure 1 in Lardy, 2012). The debate is related to the firm’s ability to access to bank loan in credit boom: if the large and state-owned firms are still bank-dependent and maintain priority to loans, then the credit boom would lead to more loan financing and higher leverage in the these firm; one the other hand, the small and private firms may have relatively more borrowings from banks during credit boom if the access restriction is removed. We solve the debate by conducting matching approach of Abadie and Imbens (2006) and investigating corporate financial policies in credit boom for groups of large firms, small firms, state-owned firms and

private firms, following the literature in credit supply side and capital structure. Our study of China's companies provides new evidence on the supply side impacts and on which firms are benefited in credit boom.

2.2 Literature Review

Faulkender and Petersen (2006, Page 46) examine the intuition that “the variables that measure the constraints on a firm's ability to increase its leverage (the supply side)” are also related to corporate capital structure. They use the presence of a credit rating to measure the access to the public debt market. Having a credit rating may help a firm to obtain more capital or cheaper capital from the public market, while a firm with limited access to public capital markets (firms that are riskier, smaller and less well known) has to rely on capital from financial intermediaries and to incur additional costs in borrowing due to the needs of increased monitoring. Their results indicate that the firms with a credit rating have a 35% larger leverage than the firms without a credit rating after controlling for the corporate variables that may determine capital structure. Those firms without a credit rating have to borrow from financial intermediaries, which the information asymmetry and the cost of monitoring would increase the cost of debt capital and ration the credit quantity.

Sufi (2009) investigates the effects of the introduction of bank loan ratings, which reduces the monitoring and certification costs of raising debt financing. The empirical results show that the introduction of bank loan ratings increases the use of debt financing and leads to more asset growth and investment, especially for the firms without a high credit quality and rating before. Similarly, Saretto and Tooke (2013) find a positive relationship between the existence of CDS trading on the firm and its leverage. The trading of CDS reduces the market friction of debt financing because a capital supplier may use CDS to reduce its regulatory capital requirement and mitigate portfolio risk and credit risk, which increases debt supply. Thus, the increase of debt supply allows firms to have larger leverage.

Other studies have explored the impacts of external shocks on capital supply in addition to a firm's ability to access external capital. Leary (2009) argues that large firms, which are relatively transparent and less informationally opaque, are able to access private debt and equity, leading to a lower impact from loan supply shocks. He uses two events, the 1961 emergence of the market for certificates of deposit and the 1966 Credit Crunch, to investigate the impacts of bank loan shocks on capital structure. The firm's characteristics (small or large; bank-dependent or non bank-dependent) that are related to informational asymmetry and transaction costs in financing, along with the supply of bank loans, determine the amounts of debt that a firm may use in a specific period. The increases (decreases) of leverage in small and bank-dependent firms are more significant for positive (negative) loan supply shocks than for large firms with access to public capital markets. The empirical results confirm the role of credit supply in capital structure. The macroeconomic conditions are found to affect a firm's capital raising decisions in Erel, Julio, Kim and Weisbach (2011). They find that lower-rated, non investment-grade firms have a lower probability to raise capital when the overall market turns worse, but the poor macroeconomic conditions do not affect the financing ability of higher-rated firms.

The availability of external financing can also influence corporate real outcomes like investment. Almeida, Campello, Laranjeira, and Weisbenner (2011) find that the firms with large portions of long term debt after the 2007 financial crisis have to reduce their investment. Lemmon and Roberts (2010) examine three events that cause a reduction in capital availability to non-investment grade firms, and test the impacts of capital availability on corporate financing patterns. The net security issuance and corporate investment are found to decrease in below investment grade firms after these events. Overall, they confirm that the exogenous shocks in the supply of capital have significant impacts on corporate behavior including financial and investment decisions. In contrary, Kahle and Stulz (2013) find that

bank-dependent firms do not have more decrease in corporate investment and net debt issuance than matching firms during the 2007 financial crisis. They question the view that bank lending supply determines corporate investment and financial policies. We will adopt similar approach to exam this view in the context of credit boom in China.

3. Data, Methods, Models and Variables

3.1 Hypotheses Development

In contrast to the studies of Faulkender and Peterson (2005), Leary (2009) and Kahle and Stulz (2013), large (and state-owned) firms in China are bank dependent due to the lack of public capital and preferential lower interest rates charged by state-owned banks at least before the recent banking reforms (Song, 2005; Ferri and Liu, 2010). Small and private firms are still limited in their access to bank lending because of information asymmetry (Firth, Lin, Liu and Wong, 2009). The state-owned banks choose what they perceive to be more reliable and better supported companies as clients, i.e., those that are large and state-owned. These companies are hence more sensitive to the exogenous shocks of bank loan supply. The prediction can be expressed in following hypothesis.

H1. Given other conditions equal, large and state-owned firms have relatively larger increases in debt (decreases) when the bank loan supplies are increased (decreased).

We also examine financing patterns and capital substitutions between internal financing and external financing that are affected by bank loan supply as previous studies show that the firms with impaired access to capital may not be able to substitute the bank loan with other source of financing and would be impacted more by bank loan shock. As mentioned before, a bank loan is the most important external financing source in many Chinese companies. With limited access to bank loans, internal funds/equity financing should be more important for

small and private firms (Guariglia, Liu and Song, 2011; Ding, Guariglia and Knight, 2013). Large and state-owned firms will turn to bank loan financing and use less internal funds or external equity financing if the bank loans are cheaper and easier to obtain in credit expansion periods. The increase (decrease) of bank loan supply will cause these firms less (more) likely to use internal funds or equity funds than small and private firms, while small and private firms have to rely on internal funds or equity funds both in credit expansion and contraction periods because they are rationed in the bank loan market. We expect that small and private firms will have to choose internal or equity funds as their preferred financing choice, while large and state-owned firm will take bank loans as their preferred choice. These financing patterns should be exaggerated when the supply of bank loans increases. We develop the following hypothesis.

H2. Given other conditions equal, large and state-owned firms are less (more) likely to use internal funds or equity funds than small and private firms when bank loan supplies increase (decrease).

Similar to previous studies in the events of credit boom and contraction, and 2007 credit crisis, we use the event of credit expansion of 2008-2010 in China to explore different financing patterns. Unlike the findings of Leary (2009), we expect that large firm and state-owned firm would obtain more loans during credit boom than small and private firms.

H3. Given other condition equal, large and state-owned firms have larger increase in corporate leverage and loan financing during credit boom (2008Q4-2010Q4) than small and private firms.

3.2 Key Variables, Methods and Models

We use two approaches to test our hypotheses. The first approach is to use multivariate regression similar to previous studies (Faulkender and Peterson, 2006; Leary, 2009; Duchih, Ozbas and Sensoy, 2010), in which the key variables are dummy variable of access to bank

loans and the interaction terms of access to bank loans and bank loan supply. The other is the matching approach of Abadie and Imbens (2006), which is used to estimate the impacts of credit crisis on corporate policies in treated and control groups (Almeida, Campello, Laranjeira and Weisbenner, 2012; Kahle and Stulz, 2013). The first approach is used to test hypothesis one and two; and the second is to investigate the hypothesis three.

In first approach, we use two dummy variables to measure whether a firm has access to bank loans based on firm size and state ownership. Many studies show that firm size is a key factor to determine whether a company can access capital markets and bank financing. Previous studies also indicate state-owned companies have priority in obtaining bank loans in China. Following the approach of Leary (2009) and Kahle and Stulz (2013), access (limited access) to bank loans by firm size is defined by the upper (lower) two deciles of quarterly average total book assets. Access (limited access) to bank loans by state ownership is defined by the upper four deciles (lower four deciles, state ownership equals to 0) of quarterly average state ownership. Appendix 1 shows the details on how the variables of access to bank loan are created in our data sample.

[Insert Appendix 1 Here]

We use three variables to measure the exogenous supply of bank loans, LOANGDP and LNLOAN, which are bank loans over GDP ratio and the log value of quarterly bank loans taken directly from the macroeconomic data provided by the People's Bank of China. These two variables are constructed to measure credit cycle in the studies of Schularick and Taylor (2012) and Aikman, Haldane and Nelson (2014). We also create a variable to measure the shocks of bank loan supply similar to Kashyap and Stein (2000), Campello (2003), and Almeida, Campello and Weisbach (2004). The variable RESLOAN is calculated from the residual of an autoregressive–moving-average model of log quarterly bank loans on three lags of the same quarter's bank loans.

The variables of interest in the first approach are the interaction terms of access variables and macroeconomic bank loan variables. Similar to the papers of Faulkender and Peterson (2006) and Leary (2009), our paper includes the variables of access to bank loans and the above interaction variables to test hypotheses H1 and H2. Variables from the demand side are also incorporated in the tests. The base regression function for leverage is,

$$LEVERAGE_{i,t} = \alpha_0 + \beta_1 ACCESS_i + \beta_2 LOAN_t * ACCESS_i + \delta X_{i,t-1} + v_i + Q_t + \varepsilon_{i,t} \quad (1)$$

The interaction term is expected to have positive coefficients according to H1. The term is dummy variable ACCESS multiplied by the bank loan supply. Control variables X are corporate variables from the demand side including market to book value (MTBV; a negative sign is expected), firm size (LNTA; positive), tangibility (TANG; positive), and profitability (PROFIT; negative)(see the discussions in Frank and Goyal, 2009). We also include state ownership (STATESHARE) as a control variable as many studies have shown that state ownership is an important factor in the capital structure decisions of Chinese companies (Qian, Tian and Wirjanto, 2009; Li, Yue and Zhao, 2009). The variable v is the fixed effect for industry⁴. The variable Q is the industry-quarter fixed effect.

The second hypothesis involves financing patterns in different groups of companies in China. We expect that the companies with limited access to bank loans will rely on internal funds (or equity financing) more heavily. We also predict that an exogenous shock in bank loans will have different impacts on the companies with full and with limited access to bank loans. A multinomial logit model similar to Denis and Mihov (2003), Korajczyk and Levy (2003), and Leary (2009) is employed to explore this financing pattern. The dependent variable FINCHOICE has a value of zero for internal funds, one for net borrowing and two for net equity financing⁵. The internal funds are the sum of net income and depreciation in the

⁴ We also run the regressions in fixed effect by firms. The results still hold.

⁵ The cash flow statements of Chinese listed companies report cash received from and paid for borrowings,

company. Net borrowing is the proceeds from borrowing net of cash repayment of amounts borrowed. Net equity financing is cash received from investment including the proceeds from equity minus cash paid for dividends. The multinomial logit models for H2 have similar forms to Equations (1) and (2).

$$mlogit(FINCHOICE_{i,t}) = \alpha_0 + \beta_1 ACCESS_i + \beta_2 LOAN_t * ACCESS_i + \delta X_{i,t-1} + v_i + Q_t + \varepsilon_{i,t} \quad (2)$$

We use the event of credit boom and employ a matching approach to test H3, similar to Almeida, Campello, Laranjera and Weisbenner (2012) and Kahle and Stulz (2013). According to the central bank's monetary policy reports, the loose monetary policy lasts from Quarter Four 2008 to Quarter Four 2010, totally nine quarters. We determine the groups of treatment firms by firm size and state ownership on the third quarter of 2008 before the credit boom periods. The groups of large firms and small firms are the firms in top and bottom quintile of total assets in our data sample on 2008Q3. Similarly, we choose the firms in the top quintile of state ownership and the firms with zero state ownership at the end of the third quarter of 2008 as state-owned group and private group. Using the approach in Abadie, Drukker, Herr and Imbens (2004), we match the firms in these four treatment groups with control firms in our data sample on 2008Q3. The variables in the matching are market-to-book ratio, cash flow, cash holdings, size, leverage ratio, state ownership, and industrial classification code, following the studies of Almeida, Campello, Laranjera and Weisbenner (2012) and Kahle and Stulz (2013). The changes of leverage ratio and loan borrowing in treatment groups due to credit boom are estimated and compared with the changes in control groups. The hypothesis three is confirmed if the treatment groups of large

investment (including equity and bond issuance) and other proceeds from financing activities. Thus, we can precisely know the amount of capital from each source. The dependent variable is measured by the financing choice in a firm that has been used most in the quarter.

firms and state-owned firms show more increases in leverage and loan financing than control firms due to credit boom.

3.3 Sample and Data Source

The firm-level data are obtained from the China Stock Market and Accounting Research Database (CSMAR). The macroeconomic data are from National Bureau of Statistics of China and the People's Bank of China. The full data sample contains all listed companies on the Chinese exchanges by quarter basis. The time periods are from 2002Q1 to 2013Q2⁶. The firms in finance industry are excluded in the sample (2601 firms in the rest). We also drop observations with negative values in total assets, sales, and cash holdings. The observations are also deleted if total liabilities are larger than total assets or market value of total assets. Following Almeida, Campello, Laranjera and Weisbenner (2012), we also disregard the observations with asset growth and sale growth larger than 100% in a quarter. Firm variables are further winsorized at the 95% level (top and bottom 2.5%) to reduce the outlier effects. The definitions and data sources of variables are given in Appendix 2.

[Insert Appendix 2 Here]

4. Results and Discussions

4.1 Summary Statistics

Table 1 reports the descriptive statistics of variables for regression functions in the full sample data. It also shows the financing patterns of Chinese listed companies. There are three major capital sources in China: internal funds, bank borrowing, and external investment (including equity and bond issuances). The most significant fund source is the borrowings (BORW) from banks or other financial institutions, which is 14.2% of total assets in each quarter. Yet the net borrowings (NETBORW), which are the borrowings net of cash repayment for amount borrowed, are only 1.4% of total assets. The reason is that the firms

⁶ The starting quarter is 2002Q1 because CSMAR started to report quarterly financial statements from 2002.

have to repay a substantial amount of principal each quarter. Internal fund (CF) is 3.7% of total assets in each quarter. Another important source is external investment, mainly the equity issuance (from data, we can find bond issuance is negligible). The fund from equity issuance (EQUITY) is 3.2% of total asset, slightly lower than internal fund. Net equity issuance (NETEQUITY) represents the funds from equity issuance net of dividend payment (approximately 3.2%). The holding of cash and cash equivalents (CASH) is high (18.1% of total assets) in China.

[Insert Table 1 Here]

4.2 Bank Loan Supply and Capital Structure

Table 2 reports the results of regression Equation (1). We use all listed companies (excluding firms in finance industry) in China's stock markets from 2002Q1 to 2013Q2. The key variable is the interaction terms of bank loan supply and access to bank loans.

[Insert Table 2 Here]

The control variables have the expected coefficient signs in accordance with capital structure theory. The variables of market to book value, profitability ratio, and internal funds have negative and very significant coefficients (in almost all regressions in the tables), indicating that firms with high growth opportunities, large profits and sufficient internal funds would choose lower leverages. Firm size is positively related to corporate leverages, which are also similar to previous findings of capital structure decisions in the US market. Intuitively, large state ownership may indicate that the firm has political connections to state-owned banks, which may result in high leverage. However, the existing empirical results are mixed. Huang and Song (2006) argue that the state ownership does not significantly influence capital structure in China's listed companies. In contrast, Qian, Tian, and Wirjanto (2009) find that the state shareholding is positively associated with the leverage ratio in listed companies. Li, Yue, and Zhao (2009) also find that state ownership is positively

related to leverage and the access to long term debt when using the data of unlisted companies. Our results show a non-significant and negative relationship between state ownership and leverage.

The key variables in this paper are the interaction terms between the access to bank loan and macroeconomic variables of bank loan supply. H1 predicts that corporate leverages increase more for firms that are able to use bank loans when the supply of the bank loans increase. We use two variables to measure the accessibility (size and state ownership) and report the results in Panel A and B respectively. In Panel A, the coefficients on the interaction terms are all positive and very significant (at the 1% level). This indicates that when the central government decided to release more bank loans, the larger companies have priority in obtaining such bank loans and hence increase leverage more. The results for the measures of accessibility by state ownership are similar, except that in model 3 of Panel B, the coefficient of interaction term is positive but non-significant. We confirm that large and state-owned firms have priority in accessing bank loans, especially when the supply of bank loans increases. These results are not surprising as many studies in China economy have revealed similar findings, but our results make contributions to existing literature in supply side effects on capital structure. We support the view that bank lending shock is first-order determinant factor in capital structure, given the unique capital market in China.

4.3 Bank Loan Supply and Financing Choice

The most important external financing in China is the borrowings from banks and other financial institutions. The other external funds include the equity issuance, bond issuance and financing from other activities. The funds from bond issuance and other activities are very few, approximately 0% and 0.5% of total assets. So we focus on the three sources of funds: internal funds, borrowings and equity issuance. Similar to the studies of Leary (2009) and Korajczyk and Levy (2003), we study the impact of bank lending supply on financing choices

using the multinomial logistic regressions. We sort firm financings into three categories: internal funds, net funds from borrowings (borrowings net of principal repayments), and net funds from equity (proceedings from equity issuance net of payment of dividends). The dependent variable FINCHOICE is equal to 0 if internal funds dominate the other two forms, 1 if borrowings dominate, and 2 if funds from equity issuance dominate. The choice of borrowings (group 1) is taken as omitted group in the regressions. The negative coefficients on the interaction terms of access to bank loans and the supply of bank loans confirm hypothesis H2. Table 3 reports the regression results for financing choices.

[Insert Table 3 Here]

The primary variable in Table 3 is the interaction variables between the access dummy (by size and state ownership) and the variables of bank loan supply. Similar to Table 2, we report the results in Panel A and B for regressions by size and state ownership respectively. In Panel A, the coefficients on the interaction variables in the regressions of internal funds and net equity are negative and significant at the 1% level; and the results in Panel B by state ownership are similar to Panel B except some insignificant coefficients. The results support the predictions of H2 that large and state-owned firms with access to bank loans are less likely to use internal funds and equity financing when the supply of bank loans increase. They are able to switch financing sources between internal funds, equity financing and bank loans. In contrast, small and private firms would have to use internal funds or equity financing because of the restrictions on who obtains bank loans. Overall, these results confirm that firms with access to bank loans are more likely to use bank loans and less likely to use internal funds or equity financing with the increase of bank loan supply. They also support the view that bank lending shocks influence corporate financing choices as bank lending can be used to substitute internal funds and funds from equity financing in some firms with access to bank lending.

There are some differences between our findings and previous studies in US. Leary (2009) finds that small firms (without access to public debt market; more bank-dependent) would use less internal funds and equity financing during credit expansion periods because they can use more bank loans. The logic is that bank-dependent firms would employ more bank loans and fewer sources other than bank loan when the bank loan supply increases. In this sense, our findings are similar to his. The large and state-owned firms in China are more bank-dependent and thus use bank lending to substitute other sources in credit booms.

4.4 Credit Boom and Corporate Financing Decisions

In this section, we test the third hypothesis by the event of credit boom from 2008Q4 to 2010Q4 in China. The bank-dependent firms will have more increases in leverage ratios and loan financings during loan boom periods according to the supply side view. We use two methods to explore the third hypothesis, by regressions with interaction terms of dummy variables for bank-dependent firms and credit boom periods (Leary, 2009; Duchin, Ozbas and Sensoy, 2010), and by matching approach (Almeida, Campello, Laranjeira and Weisbenner, 2011; and Kahle and Stulz, 2013).

The dependent variables in regressions are quarterly leverage ratio (LEVERAGE) and loan borrowing ratio (BORW), which are the ratios of total liabilities and funds borrowed from banks and other financial institutions over total assets. The variable BOOM is a dummy indicator equal to 1 if the quarter is within credit boom periods from 2008Q4 to 2010Q4, and equal to 0 if within pre-boom period 2006Q3-2008Q3.

[Insert Table 4 Here]

The regression results are presented in Table 4. As expected, large firms and state-owned firms have 2.7% and 4.1% more increases in leverage due to credit boom than small and private firms. The coefficients for interaction terms in leverage regressions are significant at least at 5% level. Model 3 and 4 in this table show that the increases of funds from

borrowings in credit boom in large and state-owned firms are 0.8% and 1.9% of total assets more than the increases in small and state-owned firms, although the coefficient in Model 3 is not significant.

The alternative method is matching approach of Abadie and Imbens (2006). By employing this approach, we need to construct treatment groups and find the matching firms in non-treatment groups. The methods of determining treatment groups and identifying control groups are introduced above, similar to Almeida, Campello, Laranjeira and Weisbenner (2011), and Kahle and Stulz (2013). We calculate the changes of leverage ratio and borrowings in the treatment groups before and during credit boom (2006Q3-2008Q3 vs. 2008Q4-2010Q4), one year before boom and the first year of credit boom (2007Q4-2008Q3 vs. 2008Q4-2009Q3), and first quarter of 2007 and first quarter of 2008 (2007Q1 vs. 2008Q1); and then we compare the differences with the differences in control groups. The Abadie-Imbens' average effect of the treatment on the treated (ATT) is reported by this difference-in-difference estimations as well as the estimators by traditional difference-in-difference (DID).

[Insert Table 5 Here]

Table 5 reports the estimators for quarterly leverage ratios before and during credit boom. Column 1 shows that the average quarterly leverage ratios in whole sample significantly increase during the credit boom, the first year of credit and the first quarter of 2009. When comes to treatment group, we find that large firms and state-owned firms increase leverage by 2.88% and 2.36% in whole credit boom period in comparison with the leverages in pre-boom periods. The leverage ratios in these two groups are also increased significantly in the first year of credit boom and the first quarter of 2009. However, the leverage ratios in small and private firms are significantly decreased in the whole credit boom period. The decreases of the last two treatment groups are not significant in the first year of

credit boom and 2009Q1, though.

The key variables are DID and ATT in the credit boom, its first year and 2009Q1, which are reported in Panel B. We can find that the increases in leverage ratios in the control groups are significantly less than the increases in treatment groups of large and state-owned firms in the whole credit boom period. DID and ATT estimators are significant at least at 5% level. According to ATT estimators, during credit boom the large and state-owned firms have 2.26% and 2.76% more increases in leverage than their matching firms. However, the small and private firms decrease leverage ratios in comparison with matching firms during credit boom. Especially, private firms significantly lower down leverage by 1.63% and 1.24% by DID and ATT estimations. Similar patterns can be seen in the first year of credit boom and 2009Q1. We can conclude that credit boom plays significantly role in capital structure in the firms that are more bank-dependent or able to access to bank loans, but it has no significant impact or even negative impact on the firms without access to bank loans.

[Insert Table 6 Here]

We conduct the same tests for the borrowings ratio before and during credit boom periods. Panel A of Table 6 shows that during the credit boom periods, the borrowings ratios increase 0.79%, 1.55% and 1.67% of total assets for the firms in whole sample, large firms group and state-owned firms group. The borrowings ratios also increase slightly in small firms and private firms with 0.73% and 0.06% respectively during credit boom. Panel B shows DID and ATT estimators for the treatment groups. State-owned firms have significant increases in loan financing by both DID and ATT estimations in whole credit boom period, first year of credit period and 2009Q1. Within the whole credit boom period, bank lending given to state-owned firms over total assets is 1.94% higher than the ratio of matching firms. Large firms have more increase in borrowings than matching firms in whole credit boom. However, the matching results indicate that large firms actually decrease borrowings more

than matching firms in the first year of credit boom and 2009Q1. The DID and ATT estimators for small firms and private firms are negative or not significant, indicating that the impacts of credit boom are trivial or negative.

Overall, we confirm that the positive shock in credit supply play significant and positive role in financial policies of large and state-owned firms. The reason is that these firms obtain the ability to access to bank loan in China's banking system. The small and private firms, however, are not affected or negatively affected by the credit boom. Our results support the view that credit supply shock is a determinant factor in financial decisions in an emerging capital market.

5. Conclusions

In this paper, we explore the question whether bank lending shock affect capital structure and financing choices in China's listed companies. Macroeconomic changes in bank loans and credit expansion from 2008 are used to test our predictions. We find that bank loan shocks significantly affect corporate leverage if the firms can access to banking system. Firms with the ability to obtain bank loans have larger increases in leverage ratios than firms restricted to banking if the bank loan supply increases. These results are similar to previous studies in supporting the view of credit supply impacts on corporate financial and investment policies. A significant difference in our studies is that bank-dependent firms are large and state-owned firms that have accessibility to bank loans.

Next, we find that the credit supply cycle and access to bank loans also influence financing choices of listed companies in China. Firms with access to bank loans are less likely to use internal funds/equity financing and are more sensitive to the changes in bank loans. In contrast, firms that have restricted access to the loan markets have to rely more on internal funds and are not able to switch to loan financing even in credit expansion periods. We also find that large and state-owned firms increase leverage and loan financing more than

matching firms in credit boom. The small and private firms have opposite results in these financing policies

Overall, these results suggest that bank lending plays significant role in determining corporate capital structure in China. They lend support to supply side view. These findings also have important policy implications for the reforms of the banking system in China. The monetary policy in China may have little impact on helping small and private firms as long as the market segmentations exist.

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Table 1: Descriptive Statistics

Note: LEVERAGE is book leverage. BORW and NETBORW are funds from borrowings and net borrowings. FINCHOICE is financing choice in choosing internal funds, bank loans or equity financing. ACCESS is the variable of access to bank loans by firm size and state ownership. LOANGROWTH is quarterly loan growth rate. LOANGDP is the ratio of loans over GDP. LNLOAN is the log value of quarterly bank loans. RSDLOAN is the residual from autoregressive model of quarterly bank loans. The detailed definitions of other controlling variables can be found in Appendix 3.

Panel A: Descriptive statistics of full sample

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Median</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<i>Dependent variables and key variables</i>						
LEVERAGE	59061	0.463	0.476	0.197	0.105	0.789
BORW	53063	0.142	0.100	0.138	0	0.465
NETBROW	53063	0.014	0.002	0.051	-0.083	0.130
FINCHOICE	59077	0.554	0	0.727	0	2
ACCESS(SIZE)	22767	0.603	1	0.489	0	1
ACCESS(STATE)	42851	0.707	1	0.455	0	1
LOANGDP	59077	4.341	4.385	0.663	3.053	5.533
LNLOAN	59077	9.264	9.470	0.738	6.576	10.740
RSDLOAN	59077	0.006	0.026	0.494	-1.602	1.394
<i>Control variables and others</i>						
MTBV	56329	2.165	1.805	1.129	0.964	5.114
PROFIT	58946	0.080	0.063	0.122	-0.180	0.358
TANG	59061	0.259	0.229	0.168	0.022	0.607
STATESHARE	57312	0.200	0.024	0.242	0	0.665
LNTA	59070	21.444	21.324	1.039	19.796	23.640
INDUSLEVE	59077	0.470	0.481	0.106	0.270	0.650
AGE	59077	11.330	11	4.934	0	31.25
GDPGROWTH	59077	0.101	0.1	0.019	0.066	0.145
CF	56264	0.037	0.028	0.034	-0.011	0.118
EQUITY	42927	0.032	0	0.092	0	0.363
NETEQUITY	42927	0.032	0	0.092	-0.002	0.362
BOND	33551	0	0	0	0	0
OTHER	43708	0.005	0	0.012	0	0.047
CASH	59059	0.181	0.141	0.136	0.023	0.515

Table 2: Bank loan supply, access to bank loans, and capital structure

$$LEVERAGE_{i,t} = \alpha_0 + \beta_1 ACCESS_i + \beta_2 LOAN_t * ACCESS_i + \delta X_{i,t-1} + v_i + Q_t + \varepsilon_{i,t}$$

The dependent variable is book leverage. Two variables are created to measure the ability to obtain bank loans by firm size and state ownership. Panel A and B report results for these two measures respectively. The key variable is the interaction term of bank loan supply and access to bank loan. The results with industry-fixed effect are given in each panel. Clustered standard errors at the firm level are presented in the brackets for coefficients. ***, **, and * are 1%, 5%, and 10% significance levels, respectively.

<i>Panel A: By firm size</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
<i>ACCESS</i>	0.089*** (0.026)	-0.157** (0.074)	0.144*** (0.014)
<i>ACCESS*LOANGDP</i>	0.013*** (0.005)		
<i>ACCESS*LNLOAN</i>		0.033*** (0.008)	
<i>ACCESS*RSDLOAN</i>			0.014*** (0.005)
<i>L.MTBV</i>	-0.018*** (0.005)	-0.017*** (0.005)	-0.019*** (0.005)
<i>L.PROFIT</i>	-0.340*** (0.048)	-0.337*** (0.048)	-0.339*** (0.048)
<i>L.TANG</i>	0.084** (0.035)	0.085** (0.035)	0.083** (0.035)
<i>L.CF</i>	-1.234*** (0.157)	-1.228*** (0.157)	-1.238*** (0.156)
<i>L.STATESHARE</i>	-0.015 (0.019)	-0.014 (0.019)	-0.015 (0.019)
<i>AGE</i>	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
<i>Constant</i>	0.423*** (0.021)	0.421*** (0.021)	0.424*** (0.022)
<i>N</i>	14370	14370	14370
<i>N of Groups</i>	1020	1020	1020
<i>Industry Fixed Effect</i>	Yes	Yes	Yes
<i>Year-Quarter Fixed Effect</i>	Yes	Yes	Yes
<i>Adjusted R-Squared</i>	0.4985	0.5008	0.4984

Table 2- cont'd

<i>Panel B: By state ownership</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
<i>ACCESS</i>	-0.022 (0.018)	-0.374*** (0.064)	0.041*** (0.010)
<i>ACCESS*LOANGDP</i>	0.014*** (0.003)		
<i>ACCESS*LNLOAN</i>		0.044*** (0.006)	
<i>ACCESS*RSDLOAN</i>			0.003 (0.003)
<i>L.MTBV</i>	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)
<i>L.PROFIT</i>	-0.469*** (0.036)	-0.465*** (0.035)	-0.469*** (0.036)
<i>L.TANG</i>	0.061** (0.024)	0.059** (0.024)	0.061** (0.024)
<i>L.CF</i>	-0.980*** (0.117)	-0.975*** (0.117)	-0.982*** (0.118)
<i>L.LNTA</i>	0.067*** (0.004)	0.066*** (0.004)	0.067*** (0.004)
<i>AGE</i>	0.005*** (0.001)	0.004*** (0.001)	0.005*** (0.001)
<i>Constant</i>	-0.974*** (0.087)	-0.950*** (0.087)	-0.979*** (0.087)
<i>N</i>	14370	14370	14370
<i>N of Groups</i>	1020	1020	1020
<i>Industry Fixed Effect</i>	Yes	Yes	Yes
<i>Year-Quarter Fixed Effect</i>	Yes	Yes	Yes
<i>Adjusted R-Squared</i>	0.5218	0.5220	0.5217

Table 3: Bank loan supply, access to bank loan and financing choices

$$mlogit = \alpha_0 + \beta_1 ACCESS_i + \beta_2 LOAN_t * ACCESS_i + \delta X_{i,t-1} + Q_t + \varepsilon_{i,t}$$

The dependent variable is financing choice, which equal to 1 if the internal funds dominate other funds, 2 if borrowings dominate, and 3 if equity financings dominate. In the result tables, borrowings are the omitted group. The key variable is the interaction term of bank loan supply and access to bank loan. Clustered standard errors at the firm level are presented in the brackets for coefficients. ***, **, and * are 1%, 5%, and 10% significance levels, respectively.

<i>Panel A: By firm size</i>	<i>Model 1</i>		<i>Model 2</i>		<i>Model 3</i>	
	<i>Internal Fund</i>	<i>Net Equity</i>	<i>Internal Fund</i>	<i>Net Equity</i>	<i>Internal Fund</i>	<i>Net Equity</i>
<i>ACCESS</i>	0.631*** (0.228)	2.554*** (0.366)	1.372*** (0.438)	3.189*** (0.658)	-0.036 (0.174)	-0.288 (0.225)
<i>ACCESS*LOANGDP</i>	-0.157*** (0.039)	-0.669*** (0.068)				
<i>ACCESS*LNLOAN</i>			-0.164*** (0.047)	-0.400*** (0.070)		
<i>ACCESS*RSOLOAN</i>					-0.105*** (0.040)	-0.461*** (0.077)
<i>L.LEVERAGE</i>	-2.633*** (0.231)	-1.552*** (0.327)	-2.617*** (0.230)	-1.528*** (0.326)	-2.627*** (0.230)	-1.535*** (0.324)
<i>L.MTBV</i>	0.116*** (0.032)	0.276*** (0.042)	0.125*** (0.032)	0.294*** (0.042)	0.114*** (0.033)	0.269*** (0.042)
<i>L.PROFIT</i>	0.569* (0.316)	-3.336*** (0.447)	0.564* (0.316)	-3.308*** (0.444)	0.593* (0.315)	-3.225*** (0.443)
<i>L.TANG</i>	0.250 (0.207)	-0.344 (0.340)	0.240 (0.206)	-0.363 (0.339)	0.250 (0.207)	-0.353 (0.338)
<i>L.OPCF</i>	8.027*** (0.470)	2.588*** (0.672)	7.985*** (0.470)	2.382*** (0.671)	7.974*** (0.470)	2.429*** (0.670)
<i>L.CASH</i>	2.131*** (0.328)	3.902*** (0.454)	2.144*** (0.328)	3.914*** (0.451)	2.124*** (0.327)	3.863*** (0.449)
<i>L.STATESHARE</i>	0.190 (0.141)	-0.225 (0.203)	0.153 (0.142)	-0.281 (0.205)	0.228 (0.141)	-0.111 (0.201)
<i>L.LNTA</i>	-0.096 (0.060)	-0.019 (0.081)	-0.049 (0.062)	0.090 (0.080)	-0.104* (0.060)	-0.038 (0.079)
<i>AGE</i>	0.025*** (0.008)	0.014 (0.010)	0.027*** (0.008)	0.017* (0.010)	0.025*** (0.008)	0.014 (0.010)
<i>GDPGROWTH</i>	-0.185 (1.459)	-8.063*** (2.439)	-0.431 (1.456)	-6.945*** (2.420)	0.900 (1.457)	-4.886** (2.386)
<i>Constant</i>	3.013** (1.232)	0.007 (1.693)	2.036 (1.277)	-2.385 (1.676)	3.066** (1.238)	0.106 (1.657)
<i>N</i>	13878		13878		13878	
<i>N of Firms</i>	1018		1018		1018	
<i>chi2</i>	1158.77		1125.99		1124.53	
<i>Pseudo R2</i>	0.1116		0.1089		0.1085	

<i>Panel B: By state</i> <i>ownership</i>	<i>Model 1</i>		<i>Model 2</i>		<i>Model 3</i>	
	<i>Internal Fund</i>	<i>Net Equity</i>	<i>Internal Fund</i>	<i>Net Equity</i>	<i>Internal Fund</i>	<i>Net Equity</i>
<i>ACCESS</i>	1.017*** (0.135)	2.104*** (0.209)	2.118*** (0.306)	0.083 (0.537)	0.163** (0.072)	-0.066 (0.099)
<i>ACCESS*LOANGDP</i>	-0.191*** (0.026)	-0.488*** (0.044)				
<i>ACCESS*LNLOAN</i>			-0.203*** (0.031)	-0.016 (0.055)		
<i>ACCESS*RSDLOAN</i>					-0.032 (0.029)	-0.133*** (0.049)
<i>L.LEVERAGE</i>	-2.818*** (0.177)	-1.499*** (0.246)	-2.800*** (0.178)	-1.499*** (0.243)	-2.816*** (0.177)	-1.502*** (0.244)
<i>L.MTBV</i>	0.113*** (0.025)	0.285*** (0.033)	0.126*** (0.025)	0.280*** (0.032)	0.109*** (0.025)	0.271*** (0.033)
<i>L.PROFIT</i>	0.558** (0.253)	-3.622*** (0.384)	0.558** (0.253)	-3.435*** (0.378)	0.598** (0.253)	-3.465*** (0.380)
<i>L.TANG</i>	0.220 (0.165)	0.593** (0.282)	0.205 (0.165)	0.546* (0.279)	0.206 (0.165)	0.548** (0.279)
<i>L.OPCF</i>	7.701*** (0.354)	1.542*** (0.486)	7.714*** (0.354)	1.222** (0.483)	7.552*** (0.353)	1.249*** (0.481)
<i>L.CASH</i>	2.199*** (0.244)	4.746*** (0.345)	2.203*** (0.245)	4.612*** (0.343)	2.146*** (0.243)	4.606*** (0.342)
<i>L.STATESHARE</i>	0.214* (0.118)	-0.352* (0.187)	0.096 (0.119)	-0.217 (0.188)	0.279** (0.118)	-0.184 (0.185)
<i>L.LNTA</i>	-0.085*** (0.030)	-0.043 (0.038)	-0.067** (0.030)	-0.044 (0.039)	-0.088*** (0.030)	-0.052 (0.038)
<i>AGE</i>	0.035*** (0.006)	0.021*** (0.008)	0.038*** (0.006)	0.021*** (0.008)	0.034*** (0.006)	0.020*** (0.008)
<i>GDPGROWTH</i>	-0.593 (1.087)	-6.602*** (1.790)	-1.175 (1.118)	-2.587 (1.746)	1.032 (1.079)	-2.848 (1.739)
<i>Constant</i>	2.539*** (0.639)	-0.371 (0.849)	2.151*** (0.641)	-0.668 (0.855)	2.473*** (0.638)	-0.466 (0.845)
<i>N</i>	26767		26767		26767	
<i>N of Firms</i>	1930		1930		1930	
<i>chi2</i>	2030.88		2004.15		1993.17	
<i>Pseudo R2</i>	0.1023		0.1007		0.0994	

Table 4: Access to bank loans, leverage, and borrowings in credit expansion

$$DV_{i,t} = \alpha_0 + \beta_1 ACCESS_i + \beta_2 ACCESS_i * BOOM_t + \delta X_{i,t-1} + v_i + Q_t + \varepsilon_{i,t}$$

The dependent variables are leverage and borrowings ratio. The borrowings ratio is the borrowings over total assets. The observations between 2006Q3 and 2010Q4 are used to explore the impacts of access to bank loan on borrowings in credit boom. Two variables are created to measure the ability to obtain bank loans by firm size and state ownership. BOOM is a dummy variable that measures whether the quarter is within the stimulus period. The key variable is the interaction term of stimulus dummy and access to bank loans. Control variables include market to book value, profitability ratio, tangibility ratio, cash flow, state ownership, log value of total asset, and firm age. The results with industry fixed effect are given in each panel. Clustered standard errors are presented in the brackets for coefficients. ***, **, and * are 1%, 5%, and 10% significance levels, respectively.

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>
	<i>Leverage</i>		<i>Borrowings</i>	
<i>ACCESS(SIZE)</i>	0.117*** (0.019)		0.063*** (0.011)	
<i>ACCESS(SIZE)*BOOM</i>	0.027** (0.014)		0.008 (0.008)	
<i>ACCESS(STATE)</i>		0.007 (0.014)		-0.020** (0.009)
<i>ACCESS(STATE)*BOOM</i>		0.041*** (0.010)		0.019** (0.008)
<i>L.MTBV</i>	-0.023*** (0.006)	-0.019*** (0.005)	-0.013*** (0.004)	-0.016*** (0.003)
<i>L.PROFIT</i>	-0.294*** (0.068)	-0.387*** (0.051)	0.043 (0.036)	0.013 (0.033)
<i>L.TANG</i>	0.084* (0.043)	0.049 (0.032)	0.069** (0.032)	0.068*** (0.021)
<i>L.CF</i>	-1.169*** (0.208)	-0.932*** (0.156)	-0.751*** (0.122)	-0.600*** (0.105)
<i>AGE</i>	0.005*** (0.001)	0.004*** (0.001)	-0.000 (0.001)	0.001 (0.001)
<i>L.STATESHARE</i>	-0.005 (0.023)		-0.039** (0.016)	
<i>L.LNTA</i>		0.055*** (0.005)		0.018*** (0.003)
<i>Constant</i>	0.468*** (0.030)	-0.671*** (0.107)	0.152*** (0.018)	-0.200*** (0.071)
<i>N</i>	5441	10190	5364	10062
<i>N of Groups</i>	726	1338	726	1337
<i>Industry Fixed Effect</i>	Yes	Yes	Yes	Yes
<i>Year-Quarter Fixed Effect</i>	Yes	Yes	Yes	Yes
<i>Adjusted R-Squared</i>	0.4856	0.4174	0.4304	0.3979

Table 5: Quarterly leverage ratio

Panel A gives quarterly leverage ratio for the whole sample and four treatment groups. It reports the average leverage ratio in these samples in six periods/quarters. The groups of large firms and small firms are the firms in top and bottom quintile of total assets in our data sample on 2008Q3. State-owned group and private group are the firms in the top quintile of state ownership and the firms with zero state ownership at the end of the third quarter of 2008. We compare the differences of leverage ratios before and during credit boom in whole sample and subsamples by t-test.

Panel B reports difference-in-difference results for the treatment groups and their control groups. The approach of Abadie, Drukker, Herr and Imbens (2004) is employed to match the firms in these four treatment groups with non-treatment firms in data sample on 2008Q3. The variables in the matching are market-to-book ratio, cash flow, cash holdings, size, state ownership, and industrial classification code, following the studies of Almeida, Campello, Laranjera and Weisbenner (2012) and Kahle and Stulz (2013). DID is the traditional difference-in-difference estimator. ATT is the Abadie-imbens bias-corrected average treated effect on the treatment group. ***, **, and * are 1%, 5%, and 10% significance levels by heteroskedasticity-consistent standard errors, respectively.

<i>Panel A: Quarterly leverage ratio before and during credit boom</i>					
	Whole	Large	State-owned	Small	Private
<i>Period averages</i>	(1)	(2)	(3)	(4)	(5)
<i>1. Pre-boom (2006Q3-2008Q3)</i>	0.4946	0.5661	0.4933	0.4068	0.4672
<i>2. Whole boom period (2008Q4-2010Q4)</i>	0.4982	0.5948	0.5169	0.3973	0.4558
<i>3. 1 year before boom (2007Q4-2008Q3)</i>	0.4917	0.5738	0.4981	0.3966	0.4590
<i>4. First year in boom (2008Q4-2009Q3)</i>	0.4974	0.5937	0.5157	0.3960	0.4548
<i>5. 2008Q1</i>	0.4901	0.5727	0.4926	0.3973	0.4568
<i>6. 2009Q1</i>	0.4964	0.5852	0.5135	0.3990	0.4544
<i>Difference (2-1)</i>	0.0036*	0.0288***	0.0236***	-0.0095*	-0.0114**
<i>Difference (4-3)</i>	0.0057***	0.0199***	0.0177***	-0.0006	-0.0042
<i>Difference (6-5)</i>	0.0063***	0.0125**	0.0209***	0.0017	-0.0024
<i>Number of firms</i>	1470	294	296	294	504

Panel B: The average changes of quarterly leverage ratio before and during credit boom

	Large	State-owned	Small	Private
	(1)	(2)	(3)	(4)
<i>Pre-boom (2006Q3-2008Q3) versus whole boom period (2008Q4-2010Q4)</i>				
<i>Treatment: whole boom - pre-boom</i>	0.0288	0.0236	-0.0095	-0.0114
<i>Control: whole boom - pre-boom</i>	0.0007	0.0038	0.0021	0.0049
<i>DID</i>	0.0281***	0.0198**	-0.0117	-0.0163***
<i>ATT</i>	0.0226**	0.0276***	-0.0022	-0.0124*
<i>Number of treatment firms</i>	288	276	280	490
<i>Number of observations in matching</i>	1432	1432	1432	1432
<i>1 year before boom (2007Q4-2008Q3) versus first year in boom (2008Q4-2009Q3)</i>				
<i>Treatment: first year - 1 year before</i>	0.0199	0.0177	-0.0006	-0.0042
<i>Control: first year - 1 year before</i>	0.0047	0.0043	0.0064	0.0074
<i>DID</i>	0.0152**	0.0134**	-0.0071	-0.0116**
<i>ATT</i>	0.0111	0.0201**	0.0043	-0.0091
<i>Number of treatment firms</i>	288	276	280	490
<i>Number of observations in matching</i>	1431	1431	1431	1431
<i>2008Q1 versus 2009Q1</i>				
<i>Treatment: 2009Q1 - 2008Q1</i>	0.0125	0.0209	0.0017	-0.0024
<i>Control: 2009Q1 - 2008Q1</i>	-0.0035	-0.0009	0.0087	0.0069
<i>DID</i>	0.0160**	0.0218***	-0.0070	-0.0093*
<i>ATT</i>	0.0085	0.0274***	0.0015	-0.0090
<i>Number of treatment firms</i>	262	257	250	445
<i>Number of observations in matching</i>	1321	1321	1321	1321

Table 6: Quarterly borrowings ratio

Panel A gives quarterly borrowings ratio (bank loan ratio) for the whole sample and four treatment groups. It reports the average borrowings ratio in these samples in six periods/quarters. The groups of large firms and small firms are the firms in top and bottom quintile of total assets in our data sample on 2008Q3. State-owned group and private group are the firms in the top quintile of state ownership and the firms with zero state ownership at the end of the third quarter of 2008. We compare the differences of borrowings ratios before and during credit boom in whole sample and subsamples by t-test.

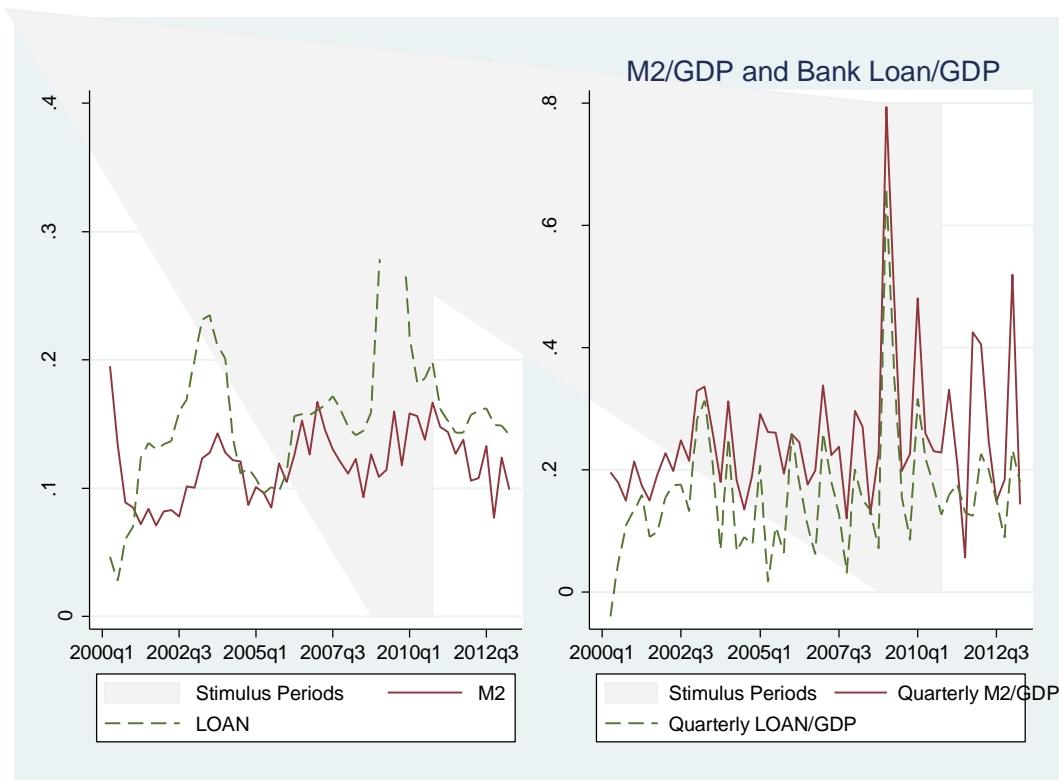
Panel B reports difference-in-difference results for the treatment groups and their control groups. The approach of Abadie, Drukker, Herr and Imbens (2004) is employed to match the firms in these four treatment groups with non-treatment firms in data sample on 2008Q3. The variables in the matching are market-to-book ratio, cash flow, cash holdings, size, leverage ratio, state ownership, and industrial classification code, following the studies of Almeida, Campello, Laranjera and Weisbenner (2012) and Kahle and Stulz (2013). DID is the traditional difference-in-difference estimator. ATT is the Abadie-imbens bias-corrected average treated effect on the treatment group. ***, **, and * are 1%, 5%, and 10% significance levels by heteroskedasticity-consistent standard errors, respectively.

<i>Panel A: Quarterly borrowings ratio before and during credit boom</i>					
	Whole	Large	State-owned	Small	Private
<i>Period averages</i>	(1)	(2)	(3)	(4)	(5)
<i>1. Pre-boom (2006Q3-2008Q3)</i>	0.1512	0.1721	0.1305	0.1060	0.1538
<i>2. Whole boom period (2008Q4-2010Q4)</i>	0.1591	0.1876	0.1473	0.1133	0.1545
<i>3. 1 year before boom (2007Q4-2008Q3)</i>	0.1477	0.1721	0.1306	0.1040	0.1478
<i>4. First year in boom (2008Q4-2009Q3)</i>	0.1502	0.1641	0.1315	0.1170	0.1521
<i>5. 2008Q1</i>	0.0604	0.0771	0.0559	0.0437	0.0620
<i>6. 2009Q1</i>	0.0684	0.0814	0.0663	0.0448	0.0655
<i>Difference (2-1)</i>	0.0079***	0.0155***	0.0167***	0.0073*	0.0006
<i>Difference (4-3)</i>	0.0024	-0.0081**	0.0009	0.0130***	0.0042
<i>Difference (6-5)</i>	0.0080***	0.0042	0.0104**	0.0012	0.0036
<i>Number of firms</i>	1476	295	296	295	506

Panel B: The average changes of quarterly borrowings ratio before and during credit boom

	Large	State-owned	Small	Private
	(1)	(2)	(3)	(4)
<i>Pre-boom (2006Q3-2008Q3) versus whole boom period (2008Q4-2010Q4)</i>				
<i>Treatment: whole boom - pre-boom</i>	0.0155	0.0167	0.0073	0.0006
<i>Control: whole boom - pre-boom</i>	0.0086	0.0021	0.0103	0.0081
<i>DID</i>	0.0070	0.0147***	-0.0030	-0.0074*
<i>ATT</i>	0.0079	0.0194***	0.0052	-0.0068
<i>Number of treatment firms</i>	288	276	280	491
<i>Number of observations in matching</i>	1432	1432	1432	1432
<i>1 year before boom (2007Q4-2008Q3) versus first year in boom (2008Q4-2009Q3)</i>				
<i>Treatment: first year - 1 year before</i>	-0.0081	0.0009	0.0130	0.0043
<i>Control: first year - 1 year before</i>	-0.0058	-0.0072	0.0065	0.0047
<i>DID</i>	-0.0023	0.0081*	0.0065	-0.0004
<i>ATT</i>	-0.0108**	0.0092*	0.0053	0.0000
<i>Number of treatment firms</i>	289	277	281	493
<i>Number of observations in matching</i>	1438	1438	1438	1438
<i>2008Q1 versus 2009Q1</i>				
<i>Treatment: 2009Q1 - 2008Q1</i>	0.0042	0.0104	0.0012	0.0036
<i>Control: 2009Q1 - 2008Q1</i>	0.0093	0.0009	0.0253	0.0107
<i>DID</i>	-0.0050	0.0095**	-0.0242***	-0.0072*
<i>ATT</i>	-0.0095*	0.0120**	-0.0264***	-0.0053
<i>Number of treatment firms</i>	260	255	249	444
<i>Number of observations in matching</i>	1316	1316	1316	1316

Figure 1: M2 and bank loan in China



Appendix 1: Firm size, state ownership and variables of access to bank loan

Note: the data comes from CSMAR. We firstly use quarterly data from 2002Q1 to 2013Q2 to create average firm size and state ownership for each company over the whole time period. Panel A shows values of Firm Size and State Ownership at the mean, min, 20th percentile, 40th percentile, 60th percentile, 80th percentile and max. Panel B indicates the conditions, firm observations and three firm characteristics for variables of access to bank loan. For the values of three access variables, they indicate the firm's ability to access bank loans is the value 1; and 0 if without access to bank loan. ACCESS(SIZE) is created from the firm size, following Leary (2009). It equals to 1 if the firm size is in upper two deciles of book asset value in all listed companies; and it is 0 if the firm size is in the lower two deciles. ACCESS(STATE) equals to 1 if the state ownership of a firm is in upper two deciles of all listed companies; and it is equal to 0 if state ownership is 0. The average ratios of firm size and state ownership for the groups with and without access to bank loans are also given in the Panel B.

Panel A: Firm Variable		Mean	Min	20th Percentile	40th Percentile	60th Percentile	80th Percentile	Max
Firm Size (log value)		21.32	19.79	20.51	20.95	21.42	22.08	23.64
State Ownership (%)		0.16	0	0	0.01	0.19	0.34	0.66
Panel B: Access Variable		Condition	N	Firm Size (Mean)	State Ownership (Mean)			
ACCESS(SIZE)=1		22.08<Firm Size<23.64	520	22.77	0.27			
ACCESS(SIZE)=0		19.79<Firm Size<20.51	520	20.21	0.08			
ACCESS(STATE)=1		0.19<State Ownership<0.66	1041	21.71	0.35			
ACCESS(STATE)=0		State Ownership=0	927	20.98	0			

Appendix 2: Definitions and data sources of variables

Variable	Variable Name and Brief Explanation
ACCESS(SIZE)	Indicator for access to bank loan by firm size. It equals to 1 if the firm size is in upper two deciles of all firm observations and 0 if in lower two deciles.
ACCESS(STATE)	Indicator for access to bank loan by state ownership. It equals to 1 if state ownership is in upper four deciles and 0 if state ownership is 0.
Net Loan	The increase of quarterly bank loan. It is the difference between outstanding bank loan this quarter and outstanding bank loan last quarter
LOANGDP	Quarterly net loan over GDP
LNLOAN	Log value of quarterly net loan
RSDLOAN	Residual of an autoregressive–moving-average model of log quarterly bank loan on three lags of the same quarter’s bank loans
BOOM	Time indicator for credit boom periods. It is a dummy that takes value 1 in stimulus periods (2008Q4-2010Q4) and 0 in the periods of 2006Q3-2008Q3
FINCHOICE	Indicator for financing choices among internal funds, borrowings and equity funds. It equals to 0 if the company mostly use internal funds, 1 if borrowings and 2 if equity financing.
LEVERAGE	Book leverage=total liability/total asset
MTBV	Market to book value
LNTA	Firms size: Natural log value of total asset
PROFIT	Profitability ratio=operating income/sale
TANG	Tangibility ratio=net fixed asset/total asset
AGE	Firm age from establishment quarter
CF	Cash flow ratio (internal fund)=(net income + depreciations)/lagged total asset
OPCF	Operating cash flow ratio=net cash flow from operating activities/lagged total asset
BORW	Borrowings ratio=proceeds from borrowings/total asset

NETBORW	Net borrowings ratio=(proceeds from borrowings - cash paid for principal)/total asset
EQUITY	Equity fund=proceeds from equity funds /total asset
NETEQUITY	Net equity fund=(proceeds from equity funds - dividend payments) / total asset
BOND	Bond fund=proceeds from bond issuance /total asset
OTHER	Other fund=other proceeds related to financing activities /total asset
CASH	Cash ratio=(cash and cash equivalents) / lagged total asset
GDPGROWTH	Quarterly GDP growth ratio
