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Bank Size and Small- and Medium-sized Enterprise (SME) Lending: Evidence from China

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Summary

Using panel data collected in 2005, we evaluate how bank size, discretion over credit, incentive schemes, competition, and the institutional environment affect lending to small- and medium-sized enterprises in China. We deal with the endogeneity problem using instrumental variables, and a reduced-form approach is also applied to allow for weak instruments in estimation. We find that total bank asset is an insignificant factor for banks' decision on small- and medium-enterprise (SME) lending, but more local lending authority, more competition, carefully designed incentive schemes, and stronger law enforcement encourage commercial banks to lend to SMEs.

Keywords

SME lending; bank size; loan approval rights; reduced-form approach; soft information

1. INTRODUCTION

The discrepancy between China's economic structure and financial structure is best manifested by the mismatch between the contribution of small- and medium-sized enterprises (SMEs) to economic growth and the amount of credit they have obtained from formal financial institutions. Since China launched its economic reform in 1978, its economy has switched into the fast lane of economic growth. China had achieved 9.75% annual GDP growth during 1979–2007, making it one of the fastest growing economies in the world by any standard. SMEs have played an active role in economic growth. According to the National Bureau of Statistics, 99.6% of enterprises in China are SMEs at the end of 2005. These enterprises account for 59% of GDP, 60% of total sales, 48.2% of taxes, and

about 75% of employment in urban areas. SMEs' participation in international trade and outward investment is also very significant, representing 68.85% of the total import and export values and about 80% of outward investment.

In contrast to its contribution to the economy, the difficulty of SMEs to obtain external financing from formal financial institutions is widely recognized. Lin (2007) documented that no more than 0.5 million of over 40 million SMEs could obtain bank loans in 2006. In other words, over 98% of SMEs have no access to formal financing. The World Bank Investment Climate Survey for China also indicates that SMEs in China are facing greater credit constraints and have more limited access to bank loans than in other Asian countries. According to this survey, SMEs in China obtain only 12% of their capital from bank loans, while their peers obtain 21% in Malaysia and 24% in Indonesia. The survey also shows that "the lack of formal finance among small firms becomes starkly worse as firm size decreases. Firms with at least 100 employees finance 27% of their capital through bank loans, compared to 39% in India. Firms with between 20 and 100 employees finance 13% of their capital through bank loans, compared to 38% in India. Firms with fewer than 20 employees finance only 2.3% of their capital, on average, through bank loans, compared to 29% in India." (Dollar, 2003, p. 41).

Lacking appropriate financing channels has become the main hurdle for the development of SMEs. Lin (2007) argues that as SMEs are often labor-intensive enterprises, their ability to absorb labor costs are reduced when they face credit constraints. Many Chinese economists have therefore encouraged the establishment of small- and medium-sized banks to deal with the difficulty of accessing bank credit for SMEs (Guo & Liu, 2002, in Chinese; Li, 2002, in Chinese; Lin & Li, 2001, in Chinese; Wang & Zhang, 2003, in Chinese; Zhang, 2000, 2002, in Chinese). These proposals are based on the idea that small- and medium-sized banks have comparative advantage in lending to SMEs because they tend to interact much more personally with their borrowers (e.g., Berger, Miller, Petersen, Rajan, & Stein, 2002) and are able to utilize more soft information (Petersen, 2004) to address problems such as informational opaqueness, moral hazard, and adverse selection (e.g., Stiglitz & Weiss, 1981).

Regardless of size, however, banks in China may lack the incentive to identify the most profitable SMEs because of the following reasons:

- Not all banks in China are solely profit-maximizing financial institutions so determining the most profitable SMEs may not suit the best interest of bank governors.
- Even if local branch managers are able to distinguish credit-worthy SMEs, they may not do so because they do not have full control over lending.
- Bank managers may not have the incentives to work hard because better quality does not necessarily mean better benefits to them.
- Factors outside of financial institutions, like bank competition, government influences, and law enforcement, can either encourage or discourage banks' lending to SMEs.

These factors raise policy concerns about the effect of establishing small- and medium-sized banks on the supply of credit to SMEs.

Existing literature has intensively studied the relationship between bank size and loans to SMEs, but it provides little information on the overall impact of the above factors. This paper therefore makes two important contributions to the literature. First, we use a unique data set to see how the factors identified in the existing literature and those unique to China affect lending to SMEs in China. These panel data were collected by us from a retrospective survey that covers 79 counties in 12 provinces in 2005. They include information on banks' governance structure, deposit, and loan policy, incentive scheme, and banks' balance sheet from 2001 to 2004. One particular strength of these data is detailed information are collected on loans. The questionnaire surveys banks' loan policy, loan approval rights, loan structure, their subjective evaluation of government influences and law enforcement, and basic information about their customers. These institutional-level data are then combined with county-level statistics to construct the final panel data. The second contribution is we provide a careful treatment of the endogeneity problem caused by the influence of SME lending share on the explanatory variables in this study. We propose instruments for our main endogenous variable and further use the reduced-form approach to provide consistent inferences even if the instrument is weak. We find that the bank size alone is not an important factor in determining SME lending. The factors affecting the bank manager's incentives, like the linkage of wage with loan quality, tend to have a significant impact on SME loans. Competition and institutional arrangements can also significantly affect loan decisions to SMEs.

Section 2 reviews the empirical literature that has examined the relationship between bank size and SME lending, and provides our main hypothesis on the role of banks in lending to SMEs in China. Section 3 gives some background information about China's banking system, describes the data set, and gives our methodology for testing the hypotheses. Section 4 presents our study's empirical results, and Section 5 concludes our work.

2. THE LITERATURE AND THE MAIN HYPOTHESES

Lending to small business can be difficult to financial institutions because of informational opaqueness, moral hazard, and adverse selection problems (e.g., Stiglitz & Weiss, 1981). Berger and Udell (2002) categorized small business lending by financial intermediaries into four main distinct technologies-financial statement lending, asset-based lending, credit scoring, and relationship lending. The first three technologies are usually referred to as transaction-based lending, which are based more on "hard" information than on "soft" information gathered over the course of a relationship with the borrower. Hard information is always recorded as numbers, while soft information is often communicated in text. This difference means that hard information can be collected, stored, and transmitted with relatively low cost. In addition, from the collection method point of view, those persons collecting and using hard information are often different, while soft information is often collected and evaluated by the same person (Petersen, 2004).

Many empirical studies support the “small bank advantage” hypothesis with regard to banks’ decisions on financing small businesses. Berger and Udell (1995, 1996), Peek and Rosengren (1998), and Strahan and Weston (1996) found that small banks tend to invest a much higher share of their assets in small business loans. Berger, Saunders, Scalise, and Udell (1998), and Peek and Rosengren (1998) studied size changes due to mergers and acquisitions (M&A) and found that bank M&A reduce small business lending. Cole, Goldberg, and White (1999) studied the lending behavior of large banks to small business and found that large banks approve their small business loans based more on financial ratios and less on the existence of prior relationships as compared with small banks, and tend to favor transactions-based lending.

However, other studies suggest that bank size does not necessarily need to decrease small business lending. For example, Strahan and Weston (1998) examined the effects of bank M&A on small business lending, and found that the M&A between small banks increased lending to small enterprises. Even though China has not experienced M&A, a similar phenomenon is the reduction of local branches during the covered sample period; hence, the bank size of local branches may not have a definite impact on small business lending. Berger, Rosen, and Udell (2001) studied the relationship between lending to SMEs and banks’ share of the local loan market. They found that the share of small business lending is roughly in proportion to small banks’ loan market share. Such phenomenon motivates us to study small business lending in China from the perspective of competition in terms of loan market structure.

A study that is of particular relevance to China is that of Berger and DeYoung (2001). They found that it is difficult for bank holding companies to control the efficiency of small banks located at a significant distance from their headquarters. This is consistent with the possibility that relationship lending may be difficult to operate from afar. As China’s financial system is dominated by four main state-owned banks and the headquarters are quite far from county-level local banks, the efficiency of small banks in making small business loans needs careful investigation. In addition to physical distance, other measures of distance can be hierarchical levels of the banks, and the loan approval rights that the local branches possess. If there are more layers between the headquarters and the local branches, relationship lending will be more difficult. On the other hand, if the local bank has 100% self-loan approval right, its physical distance from its headquarters and the bank hierarchical level are less important. China’s financial system provides enough variation in loan approval rights to study its impact on small business lending.

Berger, Klapper, and Udell (2001) also raised the distressed-bank barriers hypothesis. That is, banks in financial distress are less likely to lend to small businesses. Such negative effect will be exemplified if financial distress is directly linked to the income of loan managers because the risks of these loans cannot be easily verified. Researchers also tested whether tougher supervisory standards in examining bank portfolios will decrease relationship lending. While conclusions were mixed, they generally found that tougher standards decrease small business lending. Whether such an observation applies to China, however, remains an open question.

The literature has emphasized small banks' advantage in accessing soft information and assumes that banks will fully utilize such information, if acquired. This is a reasonable assumption for purely profit-maximizing financial institutions. If the only goal of the bank is to maximize profits, it will provide local loan managers enough incentives to collect and use soft information. The China experience can provide a new perspective because local branches in China are often not purely profit-maximizing financial institutions if the goals of the headquarters are not purely profit-maximization. Further the local government may influence loan decision making. The degree of law enforcement can be another important factor because weak law enforcement means higher default risk to enterprises. Therefore, whether local branches can access soft information is one thing, and whether local banks are willing to fully utilize such information is another.

In this paper, we aim to study how bank size in conventional measurement, soft information importance, competition and institutional arrangements affects SME lending in China. Following the literature we measure the bank size by total bank assets, and our first hypothesis is if bank size reflects the bank's ability to collect soft information, smaller bank size is not a necessary condition for greater SME lending in China. As not all financial institutions are purely profit-maximizing institutions, the local branches' attitude toward soft information may depend on how much authority they have over funds, the incentive structure, competition and institutional arrangements. Our paper makes the following contribution to the literature. We are studying the relationship between bank size and SME lending under the context that the banks may not be purely profit-maximization financial institutions. In particular, our data provide the upper branches' weight on profit in performance evaluation to allow for the possibility that local branches are partly profit-maximizing institutions. The second contribution is we study under what conditions soft information can lead to more SME lending. We find that when local branches have more authority over funds, when local bank governor's wage is linked with loan quality, and when banks are pushed to control cost, they have more incentive to use soft information. Further, we closely study how competition and institutional arrangements affect SME lending.

3. BACKGROUND, DATA, AND METHODOLOGY

In this section, we first provide background information about the Chinese financial system in Section (a), and then present the data set in Section (b). Variable definitions and summary statistics are presented in Section (c), and equations for hypothesis testing are discussed in Section (d).

(a) Background information about the Chinese financial system

China started to reform its financial system in 1978 right after the implementation of the "Open and Reform" policy. In February 1979, the central government decided to reestablish the Agricultural Bank of China (ABC) to promote the development of Agriculture. In March 1979, the Bank of China (BOC) and the China Construction Bank (CCB) were founded. In September 1983, the central government decided that the People's Bank of China would be the central bank, and established the Industrial and Commercial Bank of China (ICBC) to process industrial and commercial loans and savings in urban areas. The establishment of share-holding commercial banks started in the mid-1980s, and by 1992, there were 12 share-

holding commercial banks in China. Starting from 1992, city cooperatives were combined with city cooperative banks into city commercial banks. China's current financial system is mainly composed of four state-owned banks, 12 share-holding commercial banks, city commercial banks, and over 2,000 county-level rural credit cooperatives (RCCs).

Even though the source of external financing of China's non-financial firms had changed dramatically in the past 30 years, indirect financing through financial intermediaries dominates direct financing in China. In 2002, the relative shares of financing from bank loans, treasury bonds, corporation bonds, and equity were 80.2%, 14.4%, 1.4%, and 4%, respectively. In indirect financing, loans from state-owned banks are the main source of enterprise financing in China. Although the loans granted by state-owned banks had been continuously declining since 1978, they still accounted for 70% of the loan market in 2002.

RCCs are an indispensable part of China's financial system. By the end of 2005, RCCs have collectively become the fourth largest deposit institution in China (after ICBC, ABC, and CCB), taking about 11% of the country's loan market and 87% of agricultural loans. Unlike other financial institutions, county-level RCCs have very high loan approval rights and are directly responsible to the People's Bank of China. How such difference will affect their lending behavior will be studied in later sections.

(b) The data

The data were collected from the *Financial Ecological Environment Survey* conducted by the authors in 2005. It is a retrospective survey with most of the variables covering the period 2001–04 in which some of the variables can be dated back to 1996. The survey covers 12 provinces selected on the basis of economic development and geographical location: Zhejiang, Jiangsu, Fujian, and Shandong were selected to represent provinces in the more developed eastern coastal regions; Hubei, Jilin, and Jiangxi provinces were selected to represent the central regions; and Sichuan, Chongqing, Guizhou, Shaanxi, and Ningxia were chosen for the western regions. The geographical locations of these provinces are shown in Figure 1.

We tried to employ a properly representative sampling strategy. Each selected province was classified into high-income, middle-income, and low-income county-level districts. Two to three county-level districts were then randomly drawn from each province within each income stratum. All county-level financial institutions were then surveyed in each sampled county-level district. The distinction between county-level districts and counties is important for the justification of the representativeness of the data. In China, county-level districts include counties, districts that are named as cities but are de facto counties (county-level city), and districts in urban areas. If this survey were done only on counties in rural areas, the data may suffer from selection bias. This is because some banks could be excluded from the survey if we focused only on rural areas, and the behavior of these banks may be systematically different from those doing business in both areas. We use the standard county codes provided by the National Bureau of Statistics to define counties as rural counties, and county-level city and urban districts as urban counties. This gives 42 rural counties and 37 urban counties in our sample. As our data cover both rural areas and urban areas, it greatly reduces the possibility of selection bias.

Table 1 presents the sample distribution of the 363 financial institutions. Based on coverage, the ABC is represented in 77 of the 79 counties, followed by RCCs (73), and then the other three state-owned banks in the order of CCBs (69), ICBC (64), and BOC (57). Also sharing the markets are 19 other share-holding commercial banks such as Shanghai Pudong Development Bank and China Merchant Bank.

We further check the representativeness of the data by investigating whether deposit and loan market shares are similar to the statistics at the country level or at the provincial-level. Table 2 compares the loan and deposit market shares of our data in 2001–04 to the corresponding provincial-level data reported by Park and Seht (2001). Columns (1) and (6) present provincial averages, and columns (2)–(5), (7)–(10) are calculated based on our data. We use Park and Seht's calculation for 1997 market shares because we do not have better data with similar definitions. This table shows that overall, the market shares between provincial- and county-level data are similar. On the other hand, our data appear to give more weight to rural areas because ABCs and RCCs have stronger presence in both loan and deposit markets at the county-level, while ICBC and CCBs shares are more concentrated at the provincial-level. However, this finding is consistent with the fact that large enterprises are often at cities and provinces.

(c) Variable definitions and summary statistics

We focus on studying the factors determining banks' loans to SMEs, which is measured by the percent of loans to SMEs over the total enterprise loan outstanding. According to the National Bureau of Statistics, if an enterprise has less than 0.4 billion total assets and less than 0.3 billion sales, then it belongs to the category of SMEs. Figure 2 presents the average of the proportion of loans to SMEs for the six banks over 1996–2004. This figure shows that these banks have different time trends over SME lending. Compared with 1996, the proportions of loans to SMEs had increased in 2004 for ABC and RCCs, but they had decreased for ICBC, BOC, and shareholding Banks. CCB's lending to SMEs stayed at approximately the same level. Share-holding banks also had the largest variance in lending to SMEs over the years.

Following the literature, we use total assets to define bank size. Figure 3 presents the mean of total assets for each type of financial institutions during 2000–04. Based on this standard, RCCs were the largest bank, followed by the four state-owned banks, and then the share-holding banks. The interpretation of bank size needs caution because besides RCCs, the banks we studied here are county-level branches of countrywide banks. The common practice in the literature is to use bank-level data instead of branch-level data. This is usually accomplished through aggregating branches to get the aggregate bank size. However, this is not appropriate to the Chinese scenario because the Chinese financial system has too few banks compared with developed countries. For example, there are over 1,000 banks in the United States (Classsens & Laveven, 2004). In China, however, only 16 banks (four state-owned banks and 12 share-holding banks) remain in this sample if all the branches are added up. Such aggregation eliminates many interesting variations across branches. Another reason is that there exists heterogeneity across branches even within the same big bank. This is because in different regions, the influences from local governments and law enforcement on

local branches can be different, so that each branch acts somewhat independently from other branches and the headquarters. Therefore we choose to investigate bank size at the county-level branches.

Before considering other factors, we first check the correlation patterns between bank size and SME lending. From Table 3, we have not observed a clear connection between bank size and share of loans to small businesses. In Table 3, each kind of banks is classified as small, medium, or large based on its total assets. ABC and RCCs tend to lend more as bank size grows, while other banks, such as ICBC, BOC, and CCB decrease lending to small enterprises when the size changes from small to medium.

To induce small banks' lending to SMEs, banks need to be able to both collect and utilize soft information. We use two variables to measure local branches' ability of accessing soft information. The first is a dummy for whether the bank governor is a local resident. Local residents may have more soft information than those appointed by upper-level banks from other regions. The second variable is the bankers' perception of soft information. This is approximated through the reasons they decline loan applications. The questionnaire gives the four main reasons of loan refusals because of enterprise quality: (1) the credit rating is too low so the enterprise is not a qualified applicant, (2) the enterprise does not have enough collateral, (3) the targeted project is too risky, and (4) the enterprise can shirk from the loans. Each bank is then asked to rate the importance of these reasons for declining enterprise loan applications, with one as the most important and seven as the least important. We construct one variable measuring the importance of soft information by adding up the answers of the above four variables. The lesser the value, the less important is the soft information for the bank's loan decision making.

Whether a small bank can fully utilize the acquired soft information depends on how the incentive schemes are designed. The first issue branches may consider is how much credit they can grant. If a local branch has very limited control over credit, it tends to have little interest in using soft information because such information will not lead to much more loans. We define loan approval rights as "the share of loans that can be approved by the branches," an indicator of the degree of loan decision autonomy for county-level banks. Figure 4 compares the average loan approval rights of branch banks. The average loan approval right varies from less than 20% for CCB to over 90% for RCCs. RCCs have the highest loan approval rights mainly due to their different governance structures from other financial institutions. The variations in loan approval rights are large enough for evaluating their impact on SME lending even if RCCs were excluded.

The second issue is how bank governors are evaluated, especially on how important is branch profitability in the eyes of the upper branch. Loan managers may have more incentives to collect soft information if the resulting profits can have a more positive impact on their personal career development. In the questionnaire, each governor was asked about the weight that the upper branch has given for profits. More weight on profits implies that their profit-making abilities are assigned more weights when their performances are evaluated. Given that all non-missing observations for profit weight are positive numbers, profit-maximization will at least be part of operating goals. Therefore, we further control the

factors that can directly affect profits. From the revenue side, we consider the impact of bank competition. When the degree of competition increases, it is likely that banks are forced to find potentially the most profitable enterprises while undertaking certain degrees of risk. In other words, competition can improve the extension of credit to SMEs, *ceteris paribus*. We use the bank's loan market share to control the degree of competition. To maximize profit, banks need to control cost. We then use the average cost of deposits to describe banks' cost in acquiring funds.

In addition to branch profit considerations, the attitudes of loan managers toward using soft information are also closely related to how their earnings were determined. When earnings are linked to loan quality, bank managers will have a personally vested interest in using soft information. Hence, small banks' comparative advantage in collecting soft information will start to lead to greater SME lending. In this paper, we use the dummy variable "linkage of wage with loan quality" as control for such impact. We expect that *ceteris paribus*, branches that link wage with loan quality tend to lend more to SMEs. If the bank managers' earnings link with loan quality, they will not only have the ability but also the incentives to utilize more soft information to precisely evaluate the quality of loan. The extra information that small- and medium-sized banks have enabled them to lend more to SMEs that are often rationed out by large banks due to information asymmetry.

To fully understand the financial institutions' lending behavior toward SMEs, we need to consider institutional arrangements, which have received academic attention in the recent years. Hasan, Wachtel, and Zhou (2009) found that the legalization of the market economy (the number of lawyers per 10,000 people) and the liberalization of political institutions (the extent to which non-communist parties participate in the People's Congresses) can be employed to explain provincial GDP growth rate. We control government influence and the degree of law enforcement in this paper. We construct a dummy variable for no government influence when a local branch governor commented that they never faced influences from the local government in loan decision making, and the institution is considered as subject to government influence if branch governors replied that their loan decisions were always or sometimes influenced by the local government. Each bank governor is also asked about whether they consider collecting loans through court as a solution when enterprises default. Four options are given: (1) this is the most commonly used method, (2) sometimes, we will use it, (3) this is the last choice, and (4) it is unnecessary. We consider the degree of law enforcement as low when the bank governor chooses option (3). Presumably, profit-maximizing banks will discourage loans to small business when banks are operating in environments with weak law-enforcements. This is because their search costs tend to increase as they are more obliged to determine the qualified customers that have the ability to repay the loans.

The economic fundamentals are mainly characterized by the main local industry. We separate agricultural industries from non-agricultural industries and expect that different industrial structures can have different impacts on lending behavior.¹ Berger, Hasan, and

¹We had included the natural logs of per capital GDP to approximate the degree of economic development. This variable is then dropped as it is insignificant in all specifications.

Zhou (2009) pointed out that the reform and minority foreign ownership have effects on banks' efficiency as we use dummies for institution types, with ABC as the base group for comparison. We also use dummies if the region is a rural area. The summary statistics of the variables mentioned above are reported in Table 4.

(d) Equation for hypothesis testing

To test the main hypotheses and evaluate the impact of other mentioned factors, we run regressions on the following equation:

$$shsmeloan_{it} = \beta_0 + \beta_1 llnasset_{it} + \beta_2 laprv_{it} + \beta_3 X_{1it} + \beta_4 X_{2it} + \beta_5 X_{3it} + \varepsilon_{it}. \quad (1)$$

In Table 5, we interpret the variables used in our empirical studies. To test our main hypotheses, we need to examine the significance and direction of all the above mentioned variables. We also need to address the endogeneity problem caused by the correlation of some of the explanatory variables with the error term. We use the lags of asset size and the linkage of wage with loan quality to avoid the endogeneity caused by simultaneity. We consider loan market share to be exogenous because it is not an outcome that can simply be decided by the local branch of concern. Profit weights can also be considered as exogenous as it is mainly determined by upper branches and are quite stable over the sample period for most of the banks in this sample.² We pay particular attention to self-loan approval rights. If more loans to SMEs lead to more profits for local banks, the upper branch may grant them more loan approval rights and *vice versa*. The endogeneity problem occurs in such cases.

In this paper, we follow Wooldridge (2002, p. 89) who used county-level variations as the instrumental variable for the endogenous explanatory variable appearing in branch-level equations. For each financial institution, we use the county median self-loan approval rights as the instrument for self-loan approval rights. The idea is when upper branches make decisions about local branch loan approval rights, they need to consider more than just the situation of their own banks but also use other local banks as reference. Other things being controlled, the median variations can affect loan decision only through the endogenous variable. We, therefore, use the instrumental variable method to estimate the main equation.

Our confidence on the instrumental variable estimation results rests on the quality of the instrument. If the instruments are weak, that is, the instruments are weakly correlated with the endogenous variable, then the sampling distribution of the IV statistic is non-normal, and the TSLS estimator tend to bias toward the corresponding OLS estimator (Stock, Wright, and Yogo, 2002). In this paper, we provide the test statistic for weak instruments and also provide estimation results when the instruments are weak so that the readers can compare these two different scenarios.

To illustrate, suppose the main equation is $Y = X\beta + u$ and $X = Z\Pi + v$, where Z is NT by K matrix of instruments, and u and v are disturbance terms. We are interested in testing $H_0 : \beta = 0$ versus the alternative that $H_1 : \beta \neq 0$. How we are going to make inference about β

²To allow for endogeneity of profit weight, we also have specifications using the lag of profit weights as dependent variable. The regression results are similar, so we omit them here.

depends on the quality of the instruments. If Z is strongly correlated with X , TSLS will suffice. Following the literature, we define a concentration parameter to measure the strength of the instruments

$$\lambda^2 = \Pi' Z' Z \Pi / \sigma_v^2,$$

where σ_v^2 is the variance of v . If λ^2/k is too small, the instruments are considered as weak and the conventional normal asymptotics are misleading. Stock *et al.* (2002) show that this test can be achieved through comparing the first-stage F -statistic with critical values tabulated in Table 1 of their paper. We will perform the test for weak instruments in our paper.

If Z is indeed weakly correlated with X , we can follow Chernozhukov and Hansen (2005) to use the reduced-form approach to estimate the model. As recommended by Angrist and Krueger (2001), the biases caused by weak instruments can be solved through a reduced-form equation. The estimates of the reduced-form, that is, the ordinary least squares regression of the dependent variable on the instruments and exogenous independent variables, are unbiased even if the instruments are weak. Chernozhukov and Hansen (2005) extended this approach and found it is robust when there are heteroskedasticity and autocorrelation. This approach substitutes X into the Y equation to get $Y = Z\gamma + \varepsilon$, where $\gamma = \Pi\beta$, and $\varepsilon = \beta v + u$. Under the null hypothesis, in the exclusion restriction implying that the coefficients on the instruments should be in the reduced-form for Y , γ should be equal to zero. Thus, testing that $H_0 : \gamma = 0$ tests the hypothesis that $H_0 : \beta = 0$, as long as Z and X are correlated (Π is not a matrix of zeros). This procedure will be robust for weak instruments because in testing that the reduced-form coefficients on the instruments are equal to 0, no information about the degree of correlation between X and Z is required. This approach is attractive because it is simple to implement, and it can also be considered as simplifications or special cases of tests proposed in the literature in dealing with weak instruments in the recent years (Kleibergen, 2002, 2005, 2007; Stock & Wright, 2000).

4. EMPIRICAL RESULTS

In Table 6, we present the first-stage regression. This table indicates that the median of loan approval rights are statistically significant in all specifications, and the first-stage regressions can explain over 60% of the variation in the loan approval rights. The first-stage F -statistics for the null of weak instruments are rejected at 1% significance level for all specifications. In Tables 7 and 8, we present the TSLS regression and the reduced-form estimation allowing for weak instruments, respectively, as the rejection of the null of weak instruments does not automatically lead to the conclusion that the instruments are strong, and presenting the estimated coefficients from these two approaches allows the readers to judge strength of the selected instruments. Five specifications are presented for each table to check for the robustness of the estimated coefficients. By comparing Tables 7 and 8, we find that the significance and directions of most of the estimated coefficients are similar.

We first evaluate the impact of bank size on their lending to SMEs. Both Tables 7 and 8 indicate that after controlling other factors, bank size measured in terms of log of asset is an

insignificant factor in all specifications. This suggests that the sizes of the local banks are not the determining factor of SME lending.

We then study how the self-loan approval right affects SME lending. Column (1) of Table 7 shows that after controlling institutional effects and yearly effects, one more percent of self-loan approval right will lead to 0.11% more lending to SMEs at 10% significance level. After we add in other control factors the significances of self-loan approval right decrease but still are significant at 15% significance level except in column (3). In Table 8, the coefficients of the median of loan approval right also appear to be significant except in column (3). Putting together with its significance in the first-step regression (Table 6), the significance of the median of loan approval right suggests that more self-loan approval right significantly lead to more lending to SMEs except for specification (3).

In Table 7, we also observe that the profit weight in performance evaluation significantly affects banks' behavior in lending to SMEs, and its impact is different for RCCs and non-RCCs. Non-RCCs banks tend to decrease their lending to SMEs, with one additional percent of weight put on the performance evaluation, about 0.27% of lending to SMEs will be reduced based on specification (5). For rural credit cooperatives, one more percent of weight on profit leads to about $0.466 - 0.278 = 0.188\%$ more lending to SMEs. One can understand such differences from the perspective of the differences in institutional hierarchical level. If we are willing to define RCC as small bank since it is directly responsible to People's Bank of China, while with more layers the rest of the banks can be considered as large banks, we do find the evidences that the smaller the bank, the more SME lending.

The direct measurement of soft information importance provides interesting information in Tables 7 and 8. In Table 7, this direct measurement appears insignificant in all specifications. In Table 8, however, this variable is significant in columns (2) and (3), indicating that if the soft information importance is up by one grade, about 3–5% more lending will be granted to SMEs, but such beneficial effect disappears after we further control for wage linkage with loan quality and average cost of deposit together. Combining Tables 7 and 8 we find that only when managers' wage is linked with loan quality and banks are pushed to pay attention to the cost of deposit, the local branches will have the incentive to use soft information in loan decisions. On average, Table 7 shows that branches that link wage with overall loan quality tend to lend 7.8% more loans to SMEs than those who have not established such linkage. Also, if the average cost of deposit increase by 1%, banks tend to lend 0.13 more percentage of loans to SMEs.

Competition and the overall local institutional arrangements also appear to affect lendings to SMEs. If we measure competition by the local branches' loan market share, so that lower market share indicates more competition in the loan market, the data indicate that one more percent of loan market share will lead to about 0.36% less of lending to SMEs. Therefore, greater competition, represented by smaller loan market share for each financial institution, is beneficial to SMEs' access to credit. Further, we observe that if branches that believe the local court is not very helpful tend to lend 6.2% less loans to SMEs than those who believe the local law enforcement is strong. On the other hand, government influence is ignorable during the sample period. This is consistent with the observation that starting late 90s the

upper branches have more control over local branches than local government. Other factors can also affect SME lending. For example, rural areas appear to lend more to SMEs, which is natural because a larger portion of SMEs is located in rural areas. In addition, compared with ABC, which is not partially privatized (Berger *et al.*, 2009), all other banks have a lower share of lending to SMEs in all specifications.

Lastly, whether the governor is a local resident is an insignificant factor for SME lending. This strengthens our observations that easier access to soft information does not necessarily lead to the usage of such information. Together with the observation that banks' attitudes toward soft information are affected whether wage is linked with loan quality or profit-maximization, and whether cost control measures are implemented in specific banks, policymakers need to carefully design the incentive schemes for local banks in order to encourage lending to small- and medium-sized enterprises.³

5. CONCLUSION

The difficulty of SME financing has attracted great attention from both the government and the academia because it has important implications for long-term economic development. Many scholars in China have suggested addressing the problem through establishing small- and medium-sized banks. However, the literature has not reached consensus with regard to the relationship between bank size and small business lending, and a comprehensive evaluation of factors affecting SME lending in China is absent.

Using unique panel data constructed from the *Ecological Environment Survey* conducted by the authors in 2005, we evaluate how bank size, lending authority (self-loan approval rights), incentives of loan officers (profit weights in performance evaluation, and the payment scheme), bank competition, and institutional arrangements affect SME lending. We find that measured by total asset, bank size as is an insignificant factor for SME lending in most of our specifications. On the other hand, if we define banks with more hierarchical level as big and RCCs as small, these data provides evidences that smaller banks can lend more to SMEs. Further, if an institution has more self-loan approval right, greater competition, and if the loan manager's wage is linked with loan quality, lending to SMEs will be higher. From the institutional point of view, we find that weak law enforcement will lead to less SME lending.

The current data set also indicates that in most cases, soft information is an important consideration when banks make decisions about SME loans, only if wages are linked with loan quality and cost control measures are undertaken. The literature supporting the concept that small banks tend to provide greater SME lending narrates the story that "if a bank is small, then the bank can collect more soft information; SMEs are at a comparative advantage in providing soft information, and thus small- and medium-sized banks are more

³We have also performed fixed-effects regressions under the conventional 2SLS method and the reduced form IV methods, respectively. In both specifications, the median of loan approval right no longer appears to be significant after controlling for county-specific impact. This means that the variations in loan approval rights are mainly at the cross-section dimension rather than the time-series dimension. Other than the no significant impact in earlier regressions, the dummy for no government influences turns out to be significant and positive in the reduced-form fixed effect regression. This indicates that if the local government interferes less on loan decision making, banks are more willing to lend to SMEs. The tables for these regressions are available upon request.

willing to lend to SMEs.” Our study therefore indicates that in China, even if a bank has the advantage of collecting soft information, whether it has an incentive to fully utilize such information is critical for the success of the above story. If a local bank has higher self-loan approval rights, if the upper branch provides greater pressure in making profit through increasing the weight of profit in performance evaluation, and if wages are linked with loan quality and cost control measures are undertaken, then the local bank tends to work hard on collecting and using soft information to find high-quality customers.

The above discussion does not discourage the establishment of small- and medium-sized banks even though total bank asset is not a significant factor. In fact, more small- and medium-sized banks can lead to greater SME lending by generating more intensified competition in local markets. Also, small-sized banks with less hierarchical levels will lend more to SMEs. On the other hand, to ensure that a small- and medium-sized bank can grow in a sustainable fashion, it needs to be granted the authority to control its funds, and incentive schemes for loan managers need to be worked out carefully. In this process, the government can still play an active role, not through directly interfering in loan decisions but through fostering a good institutional environment such as stronger law enforcement.

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Figure 1.
The distribution of sampled provinces.

Figure 2.
Trend of loan to small- and medium-sized enterprises.

Figure 3.
Trend of assets of banks (county-level branches).

Figure 4.
Average loan approval rights by banks themselves.

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Table 1

Distribution of financial institutions (county branches) in the sample

	County	ABC	ICBC	CCB	BOC	Share holding banks	RCC
Zhejiang	9	8	8	8	8	5	8
Jiangsu	6	6	6	6	5	1	6
Fujian	7	7	6	7	6	2	5
Shandong	6	5	5	5	5	2	6
Hubei	10	10	6	10	8	0	10
Jilin	6	7	6	9	6	2	6
Jiangxi	6	6	6	5	6	0	6
Sichuan	6	6	4	3	2	2	6
Chongqing	8	8	6	6	6	3	6
Guizhou	6	6	4	3	0	0	6
Shaanxi	6	6	5	4	4	1	6
Ningxia	3	2	2	3	1	1	2
Total	79	77	64	69	57	19	73

Table 2

Market structures at the provincial-level and the county-level

Year	Provincial loan share			County-level loan market share			Provincial deposit share			County-level deposit market share			
	1997 (1)	2001 (2)	2002 (3)	2003 (4)	2004 (5)		1997 (6)			2001 (7)	2002 (8)	2003 (9)	2004 (10)
State-owned commercial banks	65	57.7	56.7	54.9	52.6		62			60.1	59.9	58.4	56.6
ABC	14	26.5	25.8	24.2	22.7		13			23.6	23.7	23.2	23.0
ICBC	28	17.2	16.3	15.5	14.6		26			16.8	16.2	15.2	14.6
BOC	7	5.3	5.8	6.5	6.2		7			7.8	7.9	8.1	7.7
CCB	16	8.6	8.7	8.6	9.1		15			12.0	12.1	11.9	11.1
Share holding banks	8	1.4	1.5	1.9	2.1		4			1.7	1.8	1.8	2.1
RCCs	13	24.4	26.0	27.7	31.8		10			24.2	23.6	24.2	24.7
Other financial institutions	11	10.5	9.5	9.8	9.9		12			12.8	14.0	14.8	16.0

Note: Columns (1) and (6) present the provincial averages calculated in the work of Park and Seht (2001) and columns (2)–(5), (7)–(10) are calculated based on our data.

Table 3

The average share of loan to small- and medium-sized enterprises, by branch size^a

	Small branch	Medium branch	Large branch
ABC	80.26 (28.68)	83.04 (29.00)	87.45 (21.05)
ICBC	86.95 (24.64)	76.19 (28.12)	60.20 (32.56)
CCB	79.85 (31.73)	73.81 (27.88)	70.19 (31.39)
BOC	78.45 (31.77)	71.14 (34.44)	66.52 (34.17)
Share holding banks	76.54 (28.36)	66.41 (33.45)	63.94 (22.42)
RCCs	67.86 (39.79)	70.37 (39.54)	82.26 (27.19)

Standard deviations are in parentheses.

^aBranches are divided into three quantiles based on their asset size. The branches with asset size in the lowest one third quantile are named small branches, and those in the highest one third quantile are named large branches.

Table 4

Variables definition and summary statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
Share of loan to SMEs (<i>shsme_loan</i>)	1751.00	75.55	31.68	0.00	100.00
Local bank's loan approval right (<i>laprv_sf</i>)	1389.00	43.42	40.01	0.00	100.00
Lag of log of asset (<i>lnasset</i>)	1420.00	10.96	1.14	3.04	14.54
Profit weight (<i>profitwgt</i>)	1039.00	30.66	21.01	0.00	400.00
Interaction of RCC dummy with profit weight (<i>rcaprfwgt</i>)	1039.00	6.21	12.91	0.00	60.00
Loan market share (<i>shloanmk</i>)	1342.00	17.53	14.08	0.00	94.00
Whether wage is linked with NPL (<i>respnp1</i>)	1730.00	0.63	0.48	0.00	1.00
Soft Information importance (<i>sofinf</i>)	1740.00	2.78	0.72	1.00	6.50
Dummy for no government influence (<i>nogovinf</i>)	1915.00	0.36	0.48	0.00	1.00
Dummy for weak law enforcement (<i>weaklaw</i>)	1915.00	0.39	0.49	0.00	1.00
Dummy for the county is located in rural area (<i>rural</i>)	1915.00	0.45	0.50	0.00	1.00
Average cost of deposit (<i>ac_depos</i>)	1521.00	2.95	8.10	0.00	100.00
Dummy for the governor to be a local resident (<i>nativebanker</i>)	1910.00	0.47	0.50	0.00	1.00
Dummy for the main industry is agriculture (<i>agr</i>)	1915.00	0.14	0.35	0.00	1.00

Table 5

Interpretation of variables

$shsmeloan_{it}$	The proportion of loans granted to SMEs over total enterprise loans for institution i at the end of year t
$lnasset$	The lag of natural log of total bank asset
$laprv_sf$	Local bank's loan approval rights, with 0 meaning local banks have no loan approval right, and 100 meaning they have full autonomy over loan decisions
X_{1it}	A set of explanatory variables that influences loan-making mainly through their direct impact on profits
$profitwgt$	Profit weight
$rccprfwgt$	The interaction of RCC dummy and profit weight
$shloanmk$	Loan market share
$nativebanker$	Dummy for the governor to be a local resident
$softinf$	The importance of soft information
$respnpl$	Dummy for wage linkage with loan quality
ac_depos	Average cost of deposit
X_{2it}	Indirectly affecting loan-making decisions
$nogovinf$	Dummies for no government influences
$weaklaw$	Law enforcement is weak
agr	The main industry is agriculture
X_{3it}	Other control variables, including whether the region is a rural area, institution types, and year dummies
ε_{it}	The random error term

Table 6

Factors affecting banks' lending to SMEs, the first-stage of 2SLS

	(1)	(2)	(3)	(4)	(5)
Lag of log of asset	2.612*** (0.661)	5.275*** (0.816)	5.949*** (0.838)	6.788*** (1.047)	6.665*** (1.043)
Median of loan approval right	0.468*** (0.024)	0.402*** (0.031)	0.429*** (0.031)	0.415*** (0.032)	0.422*** (0.032)
Profit weight		0.033 (0.044)	0.06 (0.044)	0.049 (0.044)	0.057 (0.044)
Interaction of RCC		0.109 (0.172)	0.117 (0.169)	0.143 (0.168)	0.083 (0.167)
dummy with profit weight					
Loan market share		0.081 (0.076)	0.045 (0.077)	0.057 (0.081)	0.068 (0.08)
Soft Information importance		-3.237** (1.406)	-2.855** (1.386)	-3.455** (1.422)	-3.28** (1.409)
Whether wage is linked with NPL			-4.122** (1.851)	-3.433* (2.004)	-3.144 (1.983)
Dummy for no government influence			-3.628** (1.823)	-3.349* (1.92)	-2.782 (1.918)
Dummy for not helpful court			6.004*** (1.836)	5.309*** (1.946)	4.242** (1.94)
Dummy for the county is located in rural area				5.057** (2.296)	5.692** (2.272)
Average cost of deposit				0.001 (0.103)	0.047 (0.102)
Dummy for the governor to be a local resident					-8.085*** (1.885)
Dummy for the main industry is agriculture					1.548 (2.737)
ICBC	-21.332*** (2.281)	-18.771*** (2.814)	-16.474*** (2.827)	-16.06*** (3.164)	-14.624*** (3.176)
BOC	-30.629*** (2.242)	-31.315*** (2.866)	-29.148*** (2.858)	-30.169*** (3.066)	-29.762*** (3.076)
CCB	-27.487*** (2.368)	-25.811*** (3.231)	-24.928*** (3.345)	-24.553*** (3.56)	-23.313*** (3.537)
Share holding banks	-20.647*** (2.895)	-23.586*** (4.834)	-16.998*** (5.184)	-13.402** (5.656)	-8.894 (5.725)
RCCs	39.083*** (2.171)	33.891*** (5.487)	35.707*** (5.387)	32.819*** (5.45)	34.34*** (5.519)
Constant	6.541 (7.543)	-11.56 (10.426)	-28.076** (10.981)	-36.521*** (13.439)	-33.549** (13.465)
Observations	1,292	791	743	662	662
R ²	0.61	0.65	0.67	0.69	0.69
F-stat.	F(7, 1,284)	F(11, 779)	F(17, 725)	F(16, 645)	F(18, 643)
	= 201.93***	= 100.72***	= 85.82***	= 73.77***	= 69.33***

Note: Standard errors in parentheses. Year dummies are included but not reported.

Dependent variable: Loan approval right.

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* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 7

Factors affecting banks' lending to SMEs, 2SLS

	(1)	(2)	(3)	(4)	(5)
Lag of log of asset	-0.434 (0.875)	-0.488 (0.996)	-0.737 (1.047)	0.898 (1.439)	0.833 (1.450)
Loan approval right	0.112* (0.065)	0.126 (0.105)	0.072 (0.100)	0.156 (0.108)	0.159 (0.106)
Profit weight		-0.223*** (0.057)	-0.244*** (0.068)	-0.279*** (0.085)	-0.278*** (0.085)
Interaction of RCC dummy with profit weight		0.423 (0.261)	0.432* (0.261)	0.472* (0.262)	0.466* (0.265)
Loan market share		-0.290** (0.117)	-0.298** (0.120)	-0.368*** (0.127)	-0.366*** (0.127)
Soft information importance		0.974 (1.712)	1.303 (1.712)	1.032 (1.824)	1.035 (1.835)
Whether wage is linked with NPL			5.085*** (2.352)	7.795*** (2.497)	7.866*** (2.493)
Dummy for no government influence			-0.469 (2.350)	-2.399 (2.571)	-2.267 (2.547)
Dummy for not helpful court			-5.751** (2.273)	-6.146** (2.491)	-6.254** (2.530)
Dummy for the county is located in rural area				5.468* (3.123)	5.523* (3.135)
Average cost of deposit				0.125** (0.058)	0.129** (0.062)
Dummy for the governor to be a local resident				-0.921 (2.630)	-0.921 (2.630)
Dummy for the main industry is agriculture				-0.461 (3.645)	-0.461 (3.645)
ICBC	-6.928** (3.220)	-11.468*** (4.029)	-13.250*** (3.979)	-11.270*** (4.229)	-11.174*** (4.279)
BOC	-7.275** (3.364)	-12.884*** (4.623)	-15.860*** (4.447)	-14.350*** (4.884)	-14.348*** (4.887)
CCB	-6.753** (3.438)	-23.459*** (4.736)	-23.833*** (4.967)	-19.271*** (5.166)	-19.127*** (5.077)
Share holding banks	-10.234*** (3.453)	-21.696*** (6.427)	-19.707*** (6.962)	-13.691* (7.628)	-13.311* (7.796)
RCCs	-14.587*** (3.714)	-28.491*** (9.573)	-24.686*** (9.365)	-30.677*** (9.547)	-30.322*** (10.001)
Constant	84.223*** (10.277)	97.943*** (12.171)	102.842*** (12.767)	79.018*** (16.480)	79.906*** (17.035)
Observations	1,292	791	743	662	662

Note: Standard errors in parentheses. Year dummies are included but not reported.

Dependent variable: The share of loan to small- and medium-sized enterprises.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

Table 8

Factors affecting banks' lending to SMEs, IV reduced-form

	(1)	(2)	(3)	(4)	(5)					
Lag of log of asset	-0.205	(0.840)	0.260	(0.942)	-0.320	(0.995)	1.657	(1.323)	1.668	(1.358)
Median of Loan approval right	0.069**	(0.029)	0.081**	(0.041)	0.065	(0.042)	0.109**	(0.044)	0.109**	(0.044)
Profit weight	-0.204***	(0.051)	-0.220***	(0.058)	-0.220***	(0.058)	-0.259***	(0.076)	-0.258***	(0.076)
Interaction of RCC dummy with profit weight	0.439*	(0.261)	0.443*	(0.261)	0.443*	(0.261)	0.512*	(0.263)	0.506*	(0.265)
Loan market share	-0.278**	(0.118)	-0.308***	(0.119)	-0.308***	(0.119)	-0.359***	(0.129)	-0.359***	(0.129)
Soft Information importance	3.376*	(1.753)	3.950**	(1.762)	3.950**	(1.762)	2.497	(1.797)	2.534	(1.817)
Whether wage is linked with NPL			5.512**	(2.383)	5.512**	(2.383)	8.065***	(2.510)	8.078***	(2.498)
Dummy for no government influence			-0.472	(2.301)	-0.472	(2.301)	-2.909	(2.492)	-2.897	(2.492)
Dummy for not helpful court			-4.578**	(2.288)	-4.578**	(2.288)	-5.095**	(2.486)	-5.210**	(2.532)
Dummy for the county is located in rural area							5.659*	(3.081)	5.729*	(3.094)
Average cost of deposit							0.127*	(0.068)	0.132*	(0.069)
Dummy for the governor to be a local resident									-0.764	(2.497)
Dummy for the main industry is agriculture									0.595	(3.644)
ICBC	-9.594***	(2.595)	-14.456***	(3.020)	-15.033***	(3.157)	-12.446***	(3.351)	-12.233***	(3.508)
BOC	-10.132***	(2.513)	-14.677***	(3.090)	-15.539***	(3.146)	-15.766***	(3.321)	-15.629***	(3.390)
CCB	-11.752***	(2.879)	-27.820***	(3.913)	-26.993***	(4.403)	-24.225***	(4.592)	-24.070***	(4.578)
Share holding banks	-14.224***	(3.303)	-23.583***	(5.744)	-20.227***	(6.675)	-14.124*	(7.435)	-13.574*	(7.804)
RCCs	-9.448***	(2.672)	-22.393***	(8.358)	-20.128**	(8.233)	-23.691***	(8.398)	-23.744***	(8.748)
Constant	84.375***	(9.808)	82.390***	(12.962) 89.432***	(13.574)	67.920***	(17.323)	67.812***	(17.923)	
Observations	1,360	818	770	678	678					

Note: Standard errors in parentheses. Year dummies are included but not reported.

Dependent variable: the share of loan to small- and medium-sized enterprises.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.