

Government Ownership, Capital Allocation and Bank Risk

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ABSTRACT

In this paper, we study the relationship between government ownership and bank risk. Two different variables are generated using the Chinese commercial banks' data from the year 2000 to 2011. One variable is z-risk which indicates the risk of insolvency based on the banks' operating performance, and the other one is Moody's financial strength ratings which measures the operation risk of individual bank. Data support that government ownership increases commercial banks' operation risk, either in terms of solvency margin or financial strength ratings. The results also indicate that larger banks have lower operation risk than smaller commercial banks. However, our empirical evidence shows that economic growth has negative impact on the operation risk of commercial banks even after controlling year-specific effect. It is surprising that foreign-owned banks have higher operation risk than local banks.

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INTRODUCTION

After China gained access to WTO in 2001, financial liberalization is one of the most important agreements promised by Chinese government. This includes "more liberalization of interest rates, more fair treatment of tax rates among players, less restrictions on ownership takeovers and M&As, and greater freedom of operational and geographical scope in The Chinese bankingsystem" (p118, Berger et al. (2009)). However, Allen et al. (2012) point out that the most successful part of the financial system in supporting rapid and persistent growth of Chinese economy is not banking sector¹. Therefore, it is necessary to examine the impact of recent financial reforms and financial liberalization on the performance and riskiness of the banking sector. Since the 2008 subprime mortgage crisis, it has become apparent that the risk-taking behaviours of individual bank could lead to systemic breakdown of the whole financial system, which affects the volatility of the national economy at the end.

Although the world economy has recovered from the shock of the global financial crisis and synchronized world-wide recession in 2008, bank bailouts during the crisis have reignited the debate about the operations of lending of last resort or too-big-to-fail. Due to asymmetric information, government supports whenever the commercial banks are in distress could easily give rise to excessive risk-taking behaviors in the banking system, which is typical a moral hazard problem (Stiglitz, 1993). However, the impact of government ownership on banks' risk-

¹ In the paper, Allen et al. (2012) argue that the critical parts in supporting the development of overall economy include internal financing and trade credits, and coalitions of various forms among firms, investors and local governments, instead of banking sector or stock exchanges.

taking lending activities is still ambiguous based on previous empirical studies. To the best of our knowledge, a number of papers examine this topic based on European and US data (Garcia-Marco and Robles-Fernández (2008), Iannotta et al. (2012)). Little is known about the relationship between government ownership and financial institutions' risk-taking behaviours among emerging markets. Therefore, the first objective of this paper is to re-examine this question based on Chinese data and provide new evidence for the recent debates.

Secondly, we plan to study the impact of recent reform of the banking industry and financial liberalization on bank risk. As we know, Chinese government promised to speed up financial liberalization and permit foreign financial institutions participating in the Chinese market. With the process of deregulation and financial liberalization, the share of state ownership has been reduced and more and more private investors are involved in monitoring and controlling the operations of commercial banks either by joint-venture or through investing in publicly listed banks. As a result, financial intermediaries in China switched from the purely state-owned banks in the early stage of the economic reform to today's diversified ownership. With the steady process of financial liberalization and less restrictions on ownership according to the WTO agreement, more and more private shareholders invest in commercial banks, so it is necessary to examine the impact of the change in governance structure on bank risk-taking behaviours.

The last objective of this paper is to differentiate the impact of government ownership on different risk patterns of commercial banks. Previous research, Iannotta et al. (2012), argues that government ownership has different effect on default risk and operation risk of commercial banks. Economists argue state ownership could lead to lower default risk due to the central bank as a lender of last resort. "Too big to fail" implies that government always needs to back up bank industry whenever there is a systemic bank crisis. An alternative hypothesis is that government-

owned commercial banks have higher operation risk since they are involved in more policy lending activities the result of direct political pressure. Therefore, we plan to study this question based on Chinese data during the period of 2000 to 2011.

In the paper, we use both z-risk and Moody's Bank Financial Strength Ratings (BFSRs) to measure operation risk. The former can be seen from Garcia-Marco and Robles-Fernández (2008), who investigate the relation between bank risk and government ownership using Spanish bank data. Iannotta et al. (2012) uses both BFSRs and issuer ratings to study the impact of government ownership on European banks' operation risk and default risk.² Data show that government ownership can significantly lower the level of z-risk, while the relation between state ownership and bank operation risk is not robust when using individual ratings. Our results support the findings from Garcia-Marco and Robles-Fernández (2008) and imply that public ownership leads to more risk-taking behavior among the commercial banks which could increase the risk of bank crisis. However, based on the data of credit ratings, the results are insignificant. One problem of the data of credit ratings is that we only have observations of 14 banks, which could limit the robustness of our results.

BACKGROUND OF CHINA'S BANKING INDUSTRY

In this section, we review the history of the Chinese banking system, including the history of bank regulation, financial reform and policy shifts in the banking industry. During the process of financial system reform, the role of the banking industry in capital allocation changes and

² In fact, Bankscope only provides both issuer ratings and individual ratings (BFSRs) for Northern American banks. Due to data limitation, we cannot find enough data to measure default risk for Chinese banks, so we skip issuer ratings in the paper and only compare the robustness of two different measurements of operation risk.

efficiency has improved step by step. The history of Chinese financial system can be divided into three stages since the establishment of the People's Republic of China in 1949.

The first stage started when the Chinese new banking system was established in 1949 and ended in 1978 when central government carried out the Open Door Policy. During this period, the financial system of China consisted of a single bank, the People's Bank of China (PBOC) controlled by the Ministry of Finance, which served as both the central bank and a commercial bank. Consequently, PBOC had absolute monopoly power in both issuing currency and acting as a financial intermediary. Actually, it controlled about 93% of the total financial assets in the country (Allen et al. (2012)). As a result, PBOC had no incentive to compete with other banks and improve its operating efficiency.

When economic reforms started in 1978 in China, the central government also considered deregulating the financial system. First, the PBOC was separated from the Ministry of Finance and became an independent entity by the end of 1979. Second, the banking system was expanded and four state-owned commercial banks were established by the end of 1984. These are the Bank of China (BOC), the People's Construction Bank of China (PCBC), the Agriculture Bank of China (ABC) and the Industrial and Commercial Bank of China (ICBC). Initially, the Big Four state-owned banks were designed to serve specific sector of the economy and the competition among them was limited (Berger et al. (2009)).

The third stage of the financial system reform started in the early of 1990s after the famous "Southern Tour" by then Chinese leader Deng Xiaoping (Allen et al. (2012)). First, a number of joint-venture banks and three big policy banks were established in the early of 1990s. The aim of establishing policy banks is to deal with gigantic non-performing loans (NPLs) and ameliorate

the asset quality of state-owned banks. Second, several state-owned banks were listed on the stock market after the establishment of two China' Stock Exchanges, the Shanghai and the Shenzhen Stock Exchange in 1994. The government planned to improve Chinese banks' management and monitor by introducing strategic foreign investment and listed on the stock exchanges. Third, after WTO entry, Chinese government allowed full access of foreign financial institutions by December 2006 based on the WTO agreement. During this stage, more competition was introduced into the Chinese banking sector and formal legislative reforms also occurred at the same time. The Central Bank Law and the Commercial Bank Law were established in 1995 and 1996, respectively. In 2003, the China Banking Regulatory Commission was established acting as the role of supervisory function.

Clearly, ownership reform and foreign investments have provided enough impetus for domestic commercial banks to improve their efficiency and bank performance. Currently, financial institutions in the Chinese banking sector include state policy bank, commercial banks, credit cooperatives and other financial institutions, while China Banking Regulation Commission and the People's Bank of China act as regulator function. Previous research support that financial system reform has improved the performance of commercial banks. However, the impact of this reform on bank risk is unclear.

LITERATURE REVIEW

The discussion of the effect of government ownership of banks can be analyzed from the following two perspectives: macro-level economic activities and micro-level individual performance. The former mainly focuses on the impact of financial structure on real economic

activities by investigating the consequences of government ownership of banks on economic growth, bank crisis, financial development, new firm's establishment and the incentive of firm's innovation which are normally based on macro-level data. On the other hand, the latter mainly studies the impact of government ownership on individual bank's performance through micro-level data, such as profitability, riskiness, insolvency.

Macro-level studies have not come to a unanimous conclusion based on either individual country's evidence or multiple countries' panel data. In fact, there are two broad views about the role of government's participating in the financial industry. The first one, "development" view, is more positive and believes that the society could gain from government ownership of banks (La Porta et al., 2002). As central planner can command government-owned banks to finance social desirable but privately unprofitable projects, policy makers can achieve their strategic development goals even though planning system could lead to inefficiency and corruption sometimes. It is quite normal to find out that most long-term public projects are not profitable in the eyes of private investors but desirable when endogenizing their positive externalities brought to our society. The other one, "political" view, is more negative and believes that government intervention could lead to inefficient allocation of capital, sluggish economic growth and low level of financial development. This point of view holds that the selfishness of politicians pushes them to take advantage of government controlled banks to achieve their own political objectives at the expense of social interests. For example, they could ask state-controlled financial institutions to finance undesirable and low-efficient projects in exchange for votes and political supports.

In fact, empirical research using macro-level data derives contradictory evidence. La Porta et al. (2002) generate an indicator to denote government ownership of banks among 92 countries

and find that government ownership is negatively related with subsequent financial development and economic growth. To indicate the level of government ownership, they use the data of the largest 10 banks of each country and calculate the average ownership directly or indirectly held by the government. The results show that, even in the period of 1990s, government ownership among financial institutions is quite high and in 1995 the average of government ownership worldwide overpasses 40%. However, Beck and Levine (2002) do not find evidence to support "development view". That is, government ownership supports economic growth. Using the average government ownership of the top 10 banks generated by La Porta et al. (2002), Beck and Levine (2002) demonstrate that there is no robust relation between the government ownership of banks and economic growth. On the contrary, Beck and Levine (2002) argue that the level of financial development and the efficiency of legal system have significant relation with new establish formation and growth rates of R&D-based or labor-intensive industries. In addition, Barth et al. (2000) use the level of financial development to represent macroeconomic performance and conclude that there is a negative relationship between state ownership and financial development with a cross-country dataset of more than 60 countries.

Micro-level studies, on the other hand, focus on the relationship between government ownership and individual bank performance or bank risk. A number of studies have examined political influence on bank performance, such as commercial banks' profit margin, lending activities and even return on assets. Using bank-level panel data, Dinc (2005) finds that government-controlled banks increase their lending in election years relative to private-controlled banks. However, the paper does not find any strong evidence to support that government-owned banks increase their lending during non-election years. Sapienza (2004) also shows that state-owned banks charge lower interest rate than private owned banks to similar

projects after controlling for exogenous variables. In addition, the author finds that lending behavior of state-owned banks is related to the party affiliation of bank's chairpersons. Normally, the associate party is stronger in the area, the lower interest rate charged to the project.

While recent studies focus on the relationship between the government ownership and bank risk. As of the 2008 subprime mortgage crisis, economists now argue that when government supports the financial sector during financial crisis, it could lead to moral hazard problem. "Too big to fail" means that commercial banks owned by the government tend to have more risk-taking behavior and are more likely to finance risky projects. Iannotta et al. (2012) use a large sample of European banks and evaluate the government ownership on bank's default risk. In the paper, they use credit ratings of each bank to identify its risk, and find that government ownership is negatively related with default risk and positively related with operation risk. Similarly, Garcia-Marco and Robles-Fernández (2008) use Spanish bank's data, and show that state-owned banks are more risk-inclined and have higher insolvent risk. Both papers provide evidence to support moral hazard hypothesis, that is, government-owned banks have more incentive to take high-risky behaviors and may induce high probability of bank crisis and lower economic growth. Given the importance of government ownership on financial institutions' risk taking, more studies are necessary to establish its causal relations and its importance for economic development.

DATA AND METHODOLOGY

Data in this paper are downloaded from *Bankscope* and the financial strength ratings are from Moody's website. As China accelerated the speed of financial liberalization in the last ten

years and even allowed foreign-funded banks operating directly in China, there are limited data on Chinese banks' ratings. In fact, even for individual ratings--Moody's BFSRs, Moody only provides ratings services for 14 Chinese banks. Therefore, the sample of this paper focuses on the observations of Chinese commercial banks in the last decade. During this period, radical banking reform has been carried out in China, including establishing joint-venture units, initial public offerings of major state-owned banks, and full access of foreign financial institutions; therefore, the data set of this paper covers the period of the last decade from 2000 to 2011. In order to study the impact of state ownership on bank risk-taking behaviors, we use the dummy variable to measure whether government can control banks' operation or not. Therefore, the dummy variable is equal to 1 if the share of state and local government held is larger than 50%, and equal to zero otherwise. Similarly, we can also generate a dummy variable to denote foreign ownership. Different from government ownership, the dummy of foreign ownership is equal to one if only if foreign banks hold 100% of shares or a local subsidiary is owned by the foreign banks.

Other control variables in this paper can be defined as follows,

- **Size:** logarithm of total asset to control the impact of different size on bank's risk-taking behaviors.
- **Government ownership:** A dummy variable that equals 1 if the share of local or national government ownership is larger than 50 percent. This variable can be derived from *BvD independent indicator*, where A indicates that there is no shareholder with shareholdings more than 25%, B indicates that there is no shareholder with shareholdings more than 50% and at least one with shareholdings more than 25%, and C and D indicate a company that has at least one shareholder with shareholdings more than 50%. Since our paper studies the impact of state ownership on bank's operation risk, we use 50% as critical value to distinguish whether government can control the bank's operation or not.

- **Listed:** Dummy variable to denote whether a commercial bank is listed on the stock exchange or not.
- **Foreign ownership:** A dummy variable equal to 1 if 100 percent owned by foreign commercial banks or foreign financial institutions.
- **GDP growth:** One variable to denote real GDP growth rate. Since banks' performance is related with national economy, we decide to include economic growth rate to measure the performance of macro-economy

The main purpose of this paper is to study the impact of government ownership on bank's risk-taking behaviors, so how to measure the level of riskiness is critical for our analysis. Iannotta et al. (2012) argue that accounting ratios based on liquidity, leverage, asset quality and or profitability are too simple to reflect aggregate risk of individual bank. Therefore, we decide to use two different variables to measure the operation risk of commercial banks in China. The first variable is borrowed from Iannotta et al. (2012). In their paper, they point out that Moody's BFSRs purely demonstrate the commercial banks' financial condition and omit the effect of any external support. As a result, the ratings can perfectly measure the insolvency risk of individual bank. Another paper, which published by Garcia-Marco and Robles-Fernández (2008), studies the difference of risk-taking behaviors between Spanish Saving banks and Commercial banks. The authors create one innovative variable, z-risk, to measure the bank's insolvency risk. They generate this variable based on the principle of Value at Risk theory, and use z-risk to measure the level of exposure to insolvency risk.

The first variable to measure the operation risk is from Moody's Bank Financial Strength Ratings. According to Moody's Ratings Symbol and Definitions, the Bank Financial Strength Ratings can be defined as follows,

"Represent Moody's opinion of a bank's intrinsic safety and soundness and, as such, exclude certain external credit risks and credit support elements that are addressed by Moody's Bank Deposit Ratings. In addition to commercial banks, Moody's BFSRs may also be assigned to other types of financial institutions such as multilateral development banks, government-sponsored financial institutions and national development financial institutions".³

Its definition implies that this rating excludes the possibility of external support and simply reflects a bank's insolvency risk. Iannotta et al. (2012) argue that this rating perfectly reflects individual bank's financial condition and is "an ideal measure of a bank's probability of becoming technically insolvent" (p157, Iannotta et al. (2012)). Original ratings from Moody's website is based on 5 letters A, B, C, D, and E with extra "+" and "-" modifier. For the purpose of empirical regression, we convert this letter-rating system into a numerical scale ranging from 1 to 15. For example, A+ is the highest rating in Moody's method and equal to 15 in our numerical scale, which is also the largest number. While E- denotes the lowest level of financial strength and equal to 1 in the numerical scale. Therefore, the larger value of numerical scale, the lower insolvency risk the commercial bank has. In addition, there only have observations of 14 Chinese commercial banks and a lot of missing observations for other small joint-venture banks and local merchant banks. So we use 0 to denote the insolvency risk of these missing observations,⁴ which gives up total 405 observations from 100 banks. The description of this

³ "Rating Symbols and Definitions"

http://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_79004 .

⁴ In fact, all of these 14 commercial banks with BFSRs' observations belong to the top 30 banks ranked by total assets.

numerical scale can be seen from Table 1. It shows that there are 104 observations from 14 large banks based on Moody's ratings.

Table 1: Moody's Financial Strength Ratings and its numerical scale

| Ratings | Ratings from Moody's website | Full sample ratings |
|-------------------------------|------------------------------|---------------------|
| A+ | 15 | 15 |
| A | 14 | 14 |
| A- | 13 | 13 |
| B+ | 12 | 12 |
| B | 11 | 11 |
| B- | 10 | 10 |
| C+ | 9 | 9 |
| C | 8 | 8 |
| C- | 7 | 7 |
| D+ | 6 | 6 |
| D | 5 | 5 |
| D- | 4 | 4 |
| E+ | 3 | 3 |
| E | 2 | 2 |
| E- | 1 | 1 |
| No ratings on Moody's website | -- | 0 |
| Total samples | 104 (14 banks) | 405 (100 banks) |

The second measure of bank operation risk represents solvency margin based on the method of Garcia-Marco and Robles-Fernández (2008), which can be calculated from the following equation,

$$P \left\{ ROA < -\frac{E}{A} + \lambda \right\} = \alpha$$

where α is equal to 0.05, the value of λ is called solvency margin indicating the level of margin of equity-to-asset ratio which leads to the probability α of bankruptcy. Garcia-Marco and Robles-Fernández (2008) believe that this measure is in line with the philosophy of the Value at Risk theory. Here, λ is equivalent to the exposure of insolvency risk. Therefore, the larger value of solvency margin λ , the lower probability of the bank will be in bankrupt owing to its operation.

To derive λ , Garcia-Marco and Robles-Fernández (2008) assume that the distribution of ROA is a normal distribution with mean of μ_{ROA} and standard deviation σ_{ROA} , and then one can calculate λ based on the following formula,

$$\lambda_{it} = \mu_{it}(ROA) + \left(\frac{E}{A}\right)_{it} - 1.645\sigma_{it}(ROA)$$

If one takes $\alpha=0.05$ and past 6-period to calculate mean and standard deviation, then the above formula changes into,

$$\lambda_{it} = \frac{1}{6}(ROA_{it} + ROA_{it-1} + ROA_{it-2} + ROA_{it-3} + ROA_{it-4} + ROA_{it-5}) + \left(\frac{E}{A}\right)_{it} - 1.645 \sigma_{it}(ROA_{it}, ROA_{it-1}, ROA_{it-2}, ROA_{it-3}, ROA_{it-4}, ROA_{it-5})$$

Similar to Iannotta et al. (2012), two different Ordinary Least Square (OLS) regressions are applied in this paper. The first one is based on BFSRs, which can be specified as follows,

$$\begin{aligned} Ratings_{it} = & \beta_0 + \beta_1 Gov\ ownership_{it} + \beta_2 Ln(assets)_{it} + \beta_3 Listed_{it} + \beta_4 GDP\ growth_{it} \\ & + \beta_5 Foreign\ ownership_{it} + \sum_{j=1}^k \gamma_j Year_{jit} + \varepsilon_{it} \end{aligned}$$

where i denotes bank i and t indicates observation at time t . $Year_j$ represents the dummy variable of year j . The data of banks' ratings are from Moody's website. Due to data limitation, we can only derive 14 banks' ratings from 2000 to 2011.

The second one is based on z-risk, which can be specified as

$$\begin{aligned} z - risk_{it} = & \beta_0 + \beta_1 Gov\ ownership_{it} + \beta_2 Ln(assets)_{it} + \beta_3 Listed_{it} + \beta_4 GDP\ growth_{it} \\ & + \beta_5 Foreign\ ownership_{it} + \sum_{j=1}^k \gamma_j Year_{jit} + \varepsilon_{it} \end{aligned}$$

As we need past 6-year observations to calculate mean and standard deviation, the time period of this regression ranges from 2005 to 2011 and this gives us 100 individual banks in the final regression.

EMPIRICAL RESULTS

In this part, we discuss our empirical findings of this paper. Table 2 is the basic summary statistics for the variables used in this paper, including both independent and dependent variables. Then our main empirical evidence is shown in Table 3 and Table 4.

Table 2 shows the basis statistics of the variables used in this paper. The first three rows are the summary of dependent variables, z-risk and credit ratings. The average of z-risk is equal to 0.31 with standard deviation equal to 0.47. While the average of credit ratings of commercial

banks in China is equal to 4.55, corresponding to D- in the letter-rating system, the average rating reduces to 1.17 when defining the rating of banks without Moody's credit ratings equal to zero. The average of returns to asset (ROA) is equal to 1%, which is approximately equal to the average of the U.S. banks. Among these 100 banks, about 24 percent of them controlled by local or state government, and 44 percent are listed on three major stock exchanges. Only 6 percent of them are totally controlled by foreign banks. The average of GDP growth in the last decade is equal to 11%, ranging from 8.3% to 14.2%.

Table 2: Basic summary of statistics

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|-------------------------------------|-----|------|-----------|--------|-------|
| Z-Risk | 344 | 0.31 | 0.47 | -2.17 | 1.22 |
| Fin. Strength Ratings (full sample) | 405 | 1.17 | 2.07 | 0 | 7 |
| Fin. Strength Ratings | 104 | 4.55 | 1.10 | 2 | 7 |
| ROA | 405 | 0.01 | 0.01 | -0.005 | 0.086 |
| Gov ownership | 405 | 0.24 | 0.43 | 0 | 1 |
| Listed | 405 | 0.44 | 0.50 | 0 | 1 |
| Foreign ownership | 405 | 0.06 | 0.25 | 0.00 | 1.00 |
| Ln(assets) | 405 | 0.12 | 0.03 | 0.03 | 0.17 |
| GDP growth | 405 | 0.11 | 0.02 | 0.083 | 0.142 |

Notes: 1, z-risk denotes insolvency risk

2, Government ownership is a dummy variable, equal to 1 if government shares is larger than 50%

3, Foreign ownership is a dummy variable, equal to 1 if 100 percent owned by Foreign multinational banks.

4. Z-risk includes 100 banks and financial ratings include 14 banks

5. Fin. Strength ratings (full sample) is equal to 0 if there is no official rating records, E-: 1, E: 2, ...and A+15.

Then we graph the relation of two measurements of operation risk in figure 1. X-axes denotes individual credit ratings and Y-axes denotes z-risk. We also draw linear fitted line of these two variables. The solid line denotes the fitted values based on full-sample, while the dotted line represents the fitted values of sample with only having credit ratings on Moody's website.

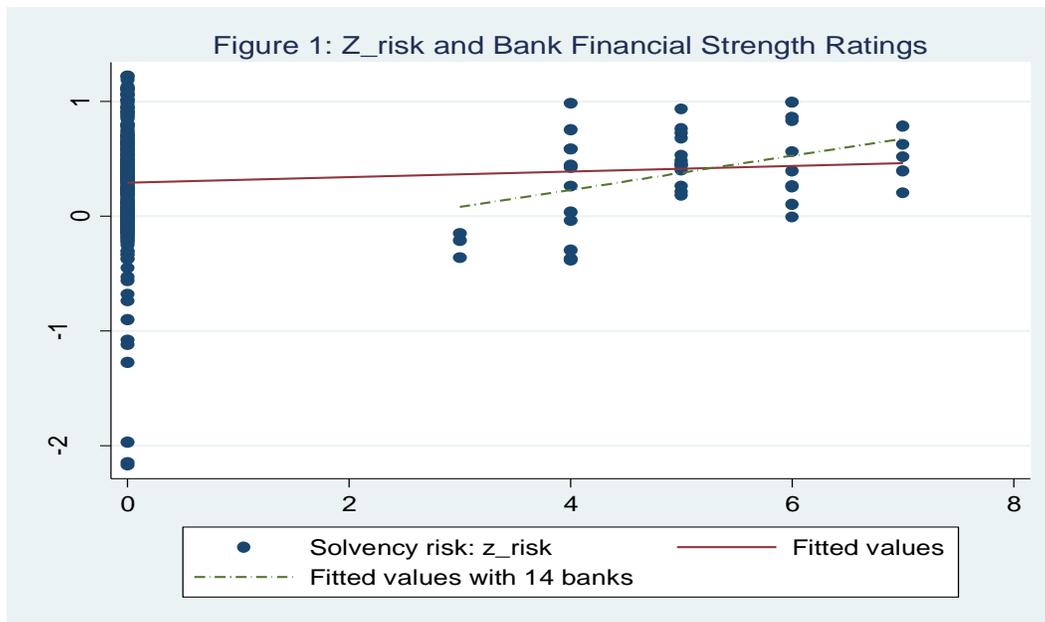


Table 3 is the result of regression of z-risk on government ownership and other control variables. The first two regressions are simple Ordinary Linear Squared (OLS) regression with controlling year fixed effect and the last one includes year dummies. The results show that government ownership can significantly reduce insolvency margin even after controlling the year dummies. Compared with private-owned banks, the insolvency margin of state-owned bank is reduced by 0.1. However, 100 percent increase in total assets can only raise insolvency margin

by 0.03. It is interesting to notice that foreign ownership reduce the insolvency margin of individual bank, which means higher operation risk. It implies that foreign-owned banks have higher operation risk than Chinese local banks. The data also show that Chinese commercial banks tend to take more risky behaviors when economy is in the boom, but this effect disappears when controlling year dummies. So it means that negative relation between GDP growth and operation risk lies in year-specific factors, not economic activities.

| Table 3: Government ownership and insolvency risk | | | |
|---|---------------------|---------------------|--------------------|
| Dependent variable: z-risk of individual bank | | | |
| Variables | Regression 1 | Regression 2 | Regression 3 |
| Gov ownership | -0.14*** (0.008) | -0.12** (0.019) | -0.094* (0.067) |
| Listed | -0.046 (0.479) | 0.0026 (0.969) | 0.092 (0.160) |
| Ln(Assets) | 0.059*** (0.005) | 0.041** (0.014) | 0.030* (0.066) |
| GDP per capita growth | | -4.66*** (0.001) | -- |
| Foreign | | -0.39* (0.088) | -0.40* (0.075) |
| _cons | -0.35 (0.143) | 0.35 (0.140) | 0.012 (0.963) |
| Year fixed effect | No | No | Yes |
| N | 344 | 344 | 344 |
| R-sq | 0.077 | 0.135 | 0.225 |
| Reports are the coefficients and p-values based on robust standard errors. The last regression controls year dummies. Total 100 banks ranging from 2005 to 2011 | | | |
| * Statistical significance at 10% level | | | |
| ** Statistical significance at 5% level | | | |
| *** Statistical significance at 1% level | | | |

Then in Table 4, we report the regression of individual credit ratings on government ownership. The first three regressions are based on full-sample of credit ratings' data. To check the robustness of our results, we also include one regression, OLS4, which only include the observations of credit ratings provided by Moody's ratings services. As a result, the last regression only has 104 observations based on 14 banks. The first three regressions show that both listed on the stock exchanges and larger total assets can significantly reduce insolvency risk. However, GDP growth rate has negative impact on operation risk. As Moody does not provide separate rating services for Chinese subsidiaries of foreign banks, the ratings of these foreign-owned banks do not reflect the riskiness of their Chinese branch, we decide to drop foreign ownership in the regressions.⁵ Government ownership increases insolvency risk in the regressions, but not significant. However, when we only include 104 observations with Moody's credit ratings, government ownership can significantly raise operation risk of individual bank.

⁵ Our results do not change qualitatively even after including the variable of foreign ownership. However, the meaning of foreign ownership is not clear at the moment.

| Table 4: Government ownership and financial strength ratings | | | | |
|--|----------|----------|---------|----------|
| Dependent variable: Financial strength ratings | | | | |
| Variables | OLS 1 | OLS 2 | OLS 3 | OLS4 |
| Gov ownership | -0.38 | -0.35 | -0.23 | -1.34*** |
| | (0.221) | (0.259) | (0.453) | (0.000) |
| Listed | 0.99*** | 1.07*** | 0.75*** | 1.18*** |
| | (0.000) | (0.000) | (0.002) | (0.000) |
| Ln(Assets) | 0.25*** | 0.23*** | 0.22*** | 0.021 |
| | (0.000) | (0.000) | (0.000) | (0.806) |
| GDP per capita | | -11.04** | -- | -- |
| growth | | (0.038) | | |
| _cons | -2.21*** | -0.92 | 2.36** | 0.28 |
| | (0.000) | (0.235) | (0.038) | (0.855) |
| Year dummies | No | No | Yes | Yes |
| N | 405 | 405 | 405 | 104 |
| R-sq | 0.212 | 0.220 | 0.307 | 0.515 |
| Reports are the coefficients and p-values based on robust standard errors. | | | | |
| Regression 3 and 4 have controled year fixed effect. | | | | |
| Regression 4 only includes 14 banks having observations of Moody's ratings | | | | |
| * Statistical significance at 10% level | | | | |
| ** Statistical significance at 5% level | | | | |
| *** Statistical significance at 1% level | | | | |

CONCLUSION

Given that bank loans account for more than two thirds of external funding sources of non-financial sectors, the future sustainable economic growth of China depends on the performance of the banking industry and the reform of financial system. The contribution of this paper provides further empirical support in analyzing the impact of government ownership on risk-

taking behaviors of the commercial banks. If government ownership of banks is negative related with operational risk of financial institutions, then the process of liberalization and the privatization of state-owned banks is good for the development of financial market and, at the same time, central bank can reduce default risk of commercial banks by acting as the lender of last resort. Another contribution of this paper is to investigate the relationship between government ownership and bank risk based on two different measurements of operation risk. In the last decade, there is a lot of literature to cover the relationship between state-ownership and bank performance in China. On the other hand, few papers use the Chinese commercial banks' data and examine the impact of state-ownership on banks' risk-taking behaviors. However, compared with bank performance which is only involved with the profitability of banking sector, the riskiness of bank system play an important role in keeping economic development persistent and sustainable. The experience of the 2008 subprime mortgage crisis indicates that risk-taking behaviors among the commercial banks can lead to financial crisis and economic recession through financial frictions.

In this paper, we study the relationship between government ownership and bank risk. Two variables are generated from this paper to measure operation risk of commercial banks. One is based on solvency margin and the other one is based on Moody's financial strength ratings. Data support that government ownership increases commercial banks' operation risk, either in terms of solvency margin or financial strength ratings. The results also indicate that larger banks have lower operation risk than smaller commercial banks. However, our empirical evidence shows that economic growth has negative impact on the operation risk of commercial banks even after controlling year-specific effect. One possible explanation is that the commercial banks change their lending criteria during the business cycle. When the economy is in the boom, credit

expansion means banks tend to expand their loans more aggressively and they could loosen their lending criteria. As a result, operation risk of commercial banks rises during the boom. On the contrary, when the economy is in the bust, credit crunch implies the banks are more prudent in lending activities. Consequently, operation risk is relatively lower during the bust. In fact, the risk during the bust is default risk, not operation risk.

It is surprising that foreign ownership also increase operation risk based on the data of z-risk. As we know, most of foreign financial subsidiaries in China are owned by multinational banks. Therefore, they should have more experiences in controlling risk-taking behaviors of lending activities. So it is worthwhile to examine this topic with more data in the future when we have more foreign banks entering into Chinese financial market. Another finding in the paper is that GDP growth has positive impact on operation risk, which contradicts our intuition. One possible solution is to compare the impact of GDP growth on operation risk with default risk. Further research is also necessary in this direction.

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APPENDIX:

A. Mody's *Bank Financial Strength Rating Definitions*

A Banks rated A possess superior intrinsic financial strength. Typically, they will be institutions with highly valuable and defensible business franchises, strong financial fundamentals, and a very predictable and stable operating environment.

B Banks rated B possess strong intrinsic financial strength. Typically, they will be institutions with valuable and defensible business franchises, good financial fundamentals, and a predictable and stable operating environment.

C Banks rated C possess adequate intrinsic financial strength. Typically, they will be institutions with more limited but still valuable business franchises. These banks will display either acceptable financial fundamentals within a predictable and stable operating environment or good financial fundamentals within a less predictable and stable operating environment.

D Banks rated D display modest intrinsic financial strength, potentially requiring some outside support at times. Such institutions may be limited by one or more of the following factors: a weak business franchise; financial fundamentals that are deficient in one or more respects; or an unpredictable and unstable operating environment.

E Banks rated E display very modest intrinsic financial strength, with a higher likelihood of periodic outside support or an eventual need for outside assistance. Such institutions may be limited by one or more of the following factors: a weak and limited business franchise; financial fundamentals that are materially deficient in one or more respects; or a highly unpredictable or unstable operating environment.

Note: Where appropriate, a "+" modifier will be appended to ratings below the "A" category and a "-" modifier will be appended to ratings above the "E" category to distinguish those banks that fall in the higher and lower ends, respectively, of the generic rating category.