



# Risking or de-risking? The effect of banking competition on large state-owned banks and small and medium-sized enterprise lending: Evidence from China

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## ABSTRACT

This study examines the effect of the expansion of small and medium-sized bank branches on large state-owned banks in China based on bank branch-level financial data and detailed loan-level data from 2008 to 2015. We find that the expansion of small and medium-sized banks favorably impacts the operating income of large state-owned banks without intensifying bank risk-taking. Large state-owned banks, used to lack competition, expand their total lending scale to achieve more operating revenue by servicing more firms, especially small and medium-sized enterprises (SMEs). This promotes SMEs' access to finance, while also raising the operating costs of large state-owned banks. More importantly, the lending standards and loan quality of large state-owned banks do not deteriorate, implying that they do not employ risky lending tactics to deal with increased competition.

## 1. Introduction

Banking institutions have dominated China's financial system; the five large state-owned banks<sup>1</sup> are the most important financial intermediaries, while the banking industry is heavily regulated (Barth, Caprio, & Levine, 2013). A central question to the debate is whether bank deregulation and increased competition are desirable. However, literature has shown opposing views. On one hand, increased bank competition may be beneficial to firms by lowering borrowing costs (Chava, Oettl, Subramanian, & Subramanian, 2013a, 2013b; Lin & Li, 2001). However, deregulation could lead to excessive competition and increased bank risk-taking (Carlson, Correia, & Luck, 2022; Jiang, Cai, Cai, & Li, 2019). This study provides evidence from China's large state-owned banks in the debate on banking deregulation.

The Chinese regulatory department is gradually deregulating its banking industry. In 2006, the China Banking Regulatory Commission (CBRC) issued the "Administrative Measures for City Commercial Banks' Offsite Branches," which clarified the conditions for city commercial banks to establish new branches within the province and cross-province, which completely changed the limitations of city commercial banks'

operations in a single city. City commercial banks began to apply for the establishment of off-site branches, but the requirements of the regulatory department were very strict, and the approval process was very lengthy. In April 2009, the CBRC announced the "Adjustment Comment on the Market Access Policy of Setting up Branches for Small and Medium-sized Commercial Banks" aimed at relaxing the restrictions on small and medium-sized banks to set up branches in new cities; particularly, the approval authority of provincial branches was delegated to the local CBRC office. This deregulation adjustment provides policy support for large-scale expansion of small and medium-sized banks.

From the macro level of data, the expansion of small and medium-sized banks has recently intensified competition in the banking industry. As shown in Fig. 1, with the continuous increase in the number of small and medium-sized bank branches after 2009, the relative share of the assets of large state-owned banks in the entire banking industry has gradually declined, from 52.5% in 2005 to approximately 40% in recent years. During the same period, the proportion of assets of small- and medium-sized banks rose steadily, from 20.9% to 30.7%.

How has the expansion of small and medium-sized banks affected large state-owned banks in recent years? Has this caused the risky

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<sup>1</sup> Large state-owned banks refer to the big five state-owned commercial banks, including the Industrial and Commercial Bank of China, Agricultural Bank of China, Bank of China, China Construction Bank and Bank of Communication. Small and medium-sized banks refer to all joint-stock banks and city commercial banks.

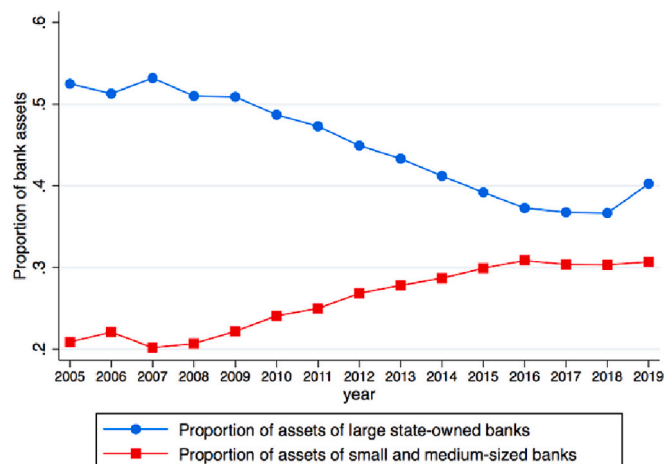


Fig. 1. Changes in banking structure.

Data Sources: CBIRC.

In April 2018, China Banking Regulatory Commission (CBRC) and China Insurance Regulatory Commission merged into China Banking and Insurance Regulatory Commission (CBIRC).

lending behavior of large state-owned banks and worsened their assets? Fig. 2 shows that the total assets of large state-owned banks have maintained an upward trend year by year, and the non-performing loan ratio has remained stable in recent years. Therefore, from the descriptive results only, bank competition does not increase operational risk or deteriorate the asset quality of large state-owned banks. To answer the above questions more rigorously, this study will further use detailed micro-level data to identify causal relationships.

Previous studies obtained financial data at the banks' head offices by adding up all branches (Akhigbe & Whyte, 2003; Allen & Gale, 2004; Cai, 2016; Fan, Qiu, & Zhang, 2011; Li, 2014; Xie & Wang, 2019). However, this study is the first to empirically examine the impact of small and medium-sized banks expansion on large state-owned banks based on detailed financial and micro-level data from 2008 to 2015 acquired at the banks' branch level. Micro-financial data at branch level can accurately measure the impact of competition at that level. We find that the expansion of small and medium-sized banks boosts the operating conditions of large state-owned banks, resulting in a significant increase of 1.07% in operating income. Further analysis shows that competition causes large state-owned banks to increase their total loan amount but does not change loan interest rates. Specifically, the increase in loan size is mainly through extensive margin; that is, large state-

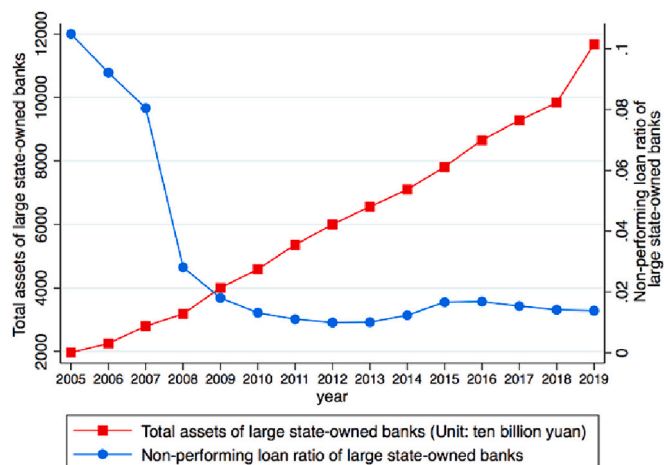


Fig. 2. The operating condition of large state-owned banks.

Data Sources: CBIRC.

owned banks actively explore more potential customers and lend loans to more firms, particularly providing credit support for small and medium-sized enterprises (SMEs). Servicing more firms, especially SMEs, increases the operating costs of large state-owned banks but does not reduce profit margins. Moreover, while expanding the scale of lending, large state-owned banks do not relax their lending standards, and the guarantee requirement and default rate of each loan do not change significantly. This indicates that large state-owned banks do not take risking actions to deteriorate loan quality or increase operating risks in the face of the competition impact brought about by the new entrant small and medium-sized banks. In summary, the expansion of small and medium-sized banks does not worsen the operating conditions of large state-owned banks but also lessens the financing difficulties of SMEs through spillover effects. Unlike negative effects of the excessively competitive geographic expansion of the US banking sector (Goetz, Laeven, & Levine, 2013; Hoffmann & Stewen, 2019), the Chinese banking industry used to have limited competition. Therefore, banking deregulation in China could yield more benefits, which provides a practical foundation for banking reform in developing countries.

Two related studies by Gao, Ru, Townsend, and Yang (2019) and Wang, Dong, and Ge (2023) have examined the effects of the 2009 bank deregulation on large industrial firms and the credit risk of the regional banking sector. Our paper contributes to the two studies in three respects. First, different from the two previous studies that respectively relied on Chinese Industry Census data and prefecture-level city loan data, we utilize more detailed micro-level loan data including information on each loan. Additionally, our dataset covers loans borrowed by firms of all sizes, not just large-scale firms but also SMEs. Second, large state-owned banks are the most important financial intermediaries, dominating the Chinese banking industry. The finding that bank competition does not increase the credit risk of large state-owned banks provides favorable evidence in support of banking deregulation. Third, the financing difficulties of SMEs is a critical issue in the credit market. It could be a more comprehensive estimate on the costs and benefits of bank competition in the credit market to take the impact on SME lending into account. In a word, our findings complement these two studies and collectively offer implications for banking deregulation in developing countries like China.

This study contributes to the literature in three ways: First, the positive spillover effect of entrants SMEs on incumbents (large state-owned banks) in the banking industry. Furthermore, it provides micro-empirical support for the literature on the effect of entry (showing beneficial and negative consequences) on incumbent firms, in various industries such as retail, manufacturing, and automobile trade (Ellison, Glaeser, & Kerr, 2010; Jia, 2008; Murry & Zhou, 2020; Vitorino, 2012). Shen and Xiao (2014) and Cao, Jin, Weng, and Zhou (2021) find that the entry of competitors positively impacts the market expansion decisions of incumbent firms in the fast food and shared bicycle industries in Chinese context. Similarly, previous studies that explore the impact of entrants intensifying competition in the banking industry also hold different views. Allen and Gale (2004) argue that the expansion of branch establishment across regions may exacerbate excessive competition in the U.S. banking industry, which can increase banks' liquidity and operational risks. However, Hughes, Lang, Mester, and Moon (1999) and Akhigbe and Whyte (2003) find that U.S. banks operating across states are more profitable with lower earnings volatility, bankruptcy risk, and market risk. Research on banking in developing countries, such as China, has the same debate. Fan et al. (2011) and Li (2014) find that the expansion of branch networks may cause damage to the profitability and asset quality of small and medium-sized banks. On the other hand, Cai (2016) revealed that expanding branches can improve the market share, net interest margin, and income structure of commercial banks, however their operating costs will increase. These studies focus only on the impact of branch expansion on the bank itself. Our study examines the effect of the branch expansion of small and medium-sized banks on large state-owned banks and to indicate that the dominance of the

Chinese banking industry does not worsen the operating performance and risk of large state-owned banks.

Second, we draw on the loan data to provide evidence from credit markets for literature on the effect of bank competition on the availability of firm credit, especially for SMEs. Bank competition is a necessary condition for the effective operation of the banking system and resource allocation, which may be an important driver of SME financing difficulties, particularly in developing financial systems such as China (Carbo-Valverde, Rodriguez-Fernandez, & Udell, 2009; Chong, Lu, & Ongena, 2013; Leon, 2015; Petersen & Rajan, 1995). Shen, Shen, Xu, and Bai (2009) and Chong et al. (2013) show that increased bank competition leads to increased SME lending in China. Gao et al. (2019) find that bank competition caused by the 2009 deregulation reduces firms' financing costs, resulting in a significant increase in the scale of assets and liabilities for firms with bank credit access. Jiang et al. (2019) concluded that bank competition significantly reduces the sensitivity of corporate investment-cash flow and eases corporate financing constraints. Our findings suggest that bank competition does not reduce the cost of credit but significantly increases the availability of firm credit, especially for SMEs, which, to a certain extent, alleviates the problem of SME financing difficulties. Due to a lack of data, few existing studies have been able to empirically test the effect of bank competition on alleviating financing constraints from the credit level, however our findings add to the research.

Third, our findings provide evidence from China regarding the debate on large banks' SME lending. The common view in the literature is that small and medium-sized banks have a comparative advantage in lending to SMEs because they can use soft information to solve the problem of information asymmetry (Berger, Miller, Petersen, Rajan, & Stein, 2002; Petersen, 2004). However, Berger, Rosen, and Udell (2007) argue that large banks are not disadvantaged when lending to SMEs. Based on two empirical analyses of the US banking industry, they find that large banks use their advantage in information-based transaction-lending technologies to lend to opaque small businesses. Our results also show that fiercer competition makes large state-owned banks provide more lending services to SMEs, and the loan quality does not decrease, which is the first empirical evidence from China. Local branches of large state-owned banks often do not have full control over lending, even if they can utilize soft information to identify credit-worthy SMEs (Shen et al., 2009). This means that it is more possible for large banks to take advantage of transaction-lending technologies that are based primarily on the analysis of hard quantitative information in SME lending. Hard information can be collected, stored, reused, and economically scalable (Petersen & Rajan, 1995), making it transmitted at a relatively lower cost within large banks. Consequently, large state-owned banks have greater incentives to compete with small and medium-sized banks for SME lending.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature and policy background for the development of the Chinese banking industry and offers an overview of related studies. Section 3 introduces the three datasets. Section 4 presents the identification strategy and regression results. Section 5 provides a series of robustness tests. Section 6 analyses the specific mechanism of the influence of the expansion of small and medium-sized banks on large state-owned banks. Section 7 concludes.

## 2. Institutional background and literature review

### 2.1. The China's banking sector and the deregulation reform

At present, the Chinese commercial banking system is made up of the Big Five state-owned commercial banks (as the first tier with the largest scale), 12 joint-stock commercial banks, 135 city commercial banks and 385 rural commercial banks.

In 1987, the first batch of joint-stock commercial banks, such as China Merchants Bank and China CITIC Bank, was established to

promote the reform of the Chinese financial system. Since then, 12 joint-stock commercial banks have been established and grown, becoming the second largest type of bank after large state-owned banks in terms of assets. Since the early 1980s, urban credit cooperatives have been established throughout the country. However, such banking institutions have gradually exposed many problems in risk management during the development process. Therefore, under the unified deployment of the central government, urban credit cooperatives have been transformed into city commercial banks through governance and rectification since 1994 (Guo & Xiong, 2018). The initial goal of city commercial banks is to serve local firms by focusing on solving the financing problems of local SMEs and regional economic development. Consequently, the business operations of city commercial banks were limited to the registered area at the beginning of their establishment. For a long time, joint-stock and city commercial banks have been subject to strict supervision and restrictions on setting up new branches in new cities, which greatly restricted their development.

In 2006, the CBRC issued "administrative measures for city commercial banks' offsite branches," which detailed the requirements for city commercial banks to open off-site branches, but the threshold for application is still high. In addition, the development of each institution has certain shortcomings, so the process of setting up branches in new cities is relatively slow for city commercial banks. In 2007, the "Notice of the CBRC on Matters Concerning Allowing Joint-Stock Commercial Banks to Establish Branches in County Areas" stipulates that joint-stock commercial banks could open new branches in cities or counties with characteristics of urban agglomerations or close economic areas under the principle of commercial sustainability. The number of branches of joint-stock banks has increased (Lyu & Wang, 2019).

In April 2009, the "Adjustment Comment on the Market Access Policy of Setting up Branches for Small and Medium-sized Commercial Banks" was introduced by the CBRC as a significant and vital policy deregulating the Chinese banking system. This adjustment aimed to free joint-stock banks and city commercial banks by allowing them to open branches in new cities. Specifically, joint-stock banks can enter all cities in a province freely if they have branches in the capital city of the given province. City commercial banks can enter all cities in a province when the headquarters of the city commercial banks are located in the province. More importantly, for these deregulated cities and cities in which they have already established branches, joint-stock banks and city commercial banks can freely open branches without any restrictions on the number of branches opened.

Additionally, the bank entry deregulation policy in April 2009 dramatically reduced the cost and waiting periods of new branch entry applications for joint-stock banks and city commercial banks. On the one hand, no specific requirement for capital amounts for new branches was imposed. On the other hand, for each application, joint-stock banks and city commercial banks can apply to open multiple branches with the approval of the local CBRC office rather than the central CBRC office, which renders the application process simpler and more efficient.

The 2009 deregulation shock significantly impacted the expansion of small and medium-sized banks, serving as a milestone in the development of commercial banks and in growing levels of competition in China's banking industry. Consequently, this exogenous policy shock creates conditions for this study to construct instrumental variables to solve the endogenous problem of the expansion of small and medium-sized banks.

### 2.2. Literature review

This paper is related to three strands of the literature. The first strand of the literature investigates the economic effects of banking deregulation. Increased bank competition can improve credit supply (Chu, 2018; Keil & Müller, 2020) and lending efficiency (Jiang, Levine, & Lin, 2016). Further, it has an impact on the activities of firms such as investment, employment and innovation (Chava et al., 2013a, 2013b; Francis,

Hasan, & Wang, 2014), thereby fueling economic growth (Dick & Lehnert, 2010; Gao et al., 2019).

The second strand of the literature examines how deregulation affects bank risk. A body of literature has shown that increased competition encourages bank's risk-taking behaviors (Allen & Gale, 2000; Berger, El Ghoul, Guedhami, & Roman, 2017), including lowering lending criteria, attracting deposits with higher interest and reducing guarantee standards (Bushman, Hendricks, & Williams, 2016; Wang et al., 2023). However, other studies argue that deregulation could reduce the risk of banks because banks will act more prudently to deal with increased competition intensity (Arping, 2019; Goetz, 2018; Goetz, Laeven, & Levine, 2016). Yet studies on how incumbent banks respond to the deregulation shock are scarce.

The third strand of the literature discusses the role of large banks in SME lending. The literature commonly suggests that small and medium-sized banks possess a comparative advantage in lending to SMEs due to their ability to leverage soft information, thereby addressing information asymmetry (Berger et al., 2002; Petersen, 2004). However, Berger et al. (2007) have found the opposite fact through two empirical analyses of the US banking industry. They contend that large banks are not at a disadvantage when lending to SMEs, as large banks effectively utilize their information-based transaction-lending technologies to extend loans to less transparent small firms. There is little attention to how large banks serve SMEs in developing countries.

The existing literature primarily emphasizes banking deregulation in developed countries. However, the market structure of Chinese banking industry differs from that of the US. For instance, there were numerous mergers following deregulation in the US, whereas only a few occurred in China (Wang et al., 2023). This difference stems from the more advanced and even excessively competitive nature of the US banking sector, while the Chinese banking industry lacks competition. Therefore, additional empirical evidence regarding Chinese banking reform is required. This paper offers a practical basis for the debate on banking deregulation in China, with a focus on the country's large state-owned banks.

### 3. Data

We used three datasets for our empirical analyses: China Banking and Insurance Regulatory Commission (CBIRC) branch data, financial data at the bank branch level, and bank loan data for six cities in a province in China.

#### 3.1. CBIRC branch data

The first dataset includes information on all bank branches in China since 1949, released by the CBIRC. This dataset contains branch-level information such as full names, branch IDs, branch addresses, and dates of establishment. Branch ID is used to identify whether the type of bank branch belongs to a large state-owned commercial bank, joint-stock commercial bank, or city commercial bank. The province and city in which the bank branch is located can be identified based on the branch address. Consequently, we can use this dataset to measure the number of small and medium-sized bank branches in each city from 2008 to 2015. For our analyses, we restrict the bank branch sample to large state-owned, joint-stock, and city commercial banks.

#### 3.2. Bank branch financial data

Bank branch level financial data from 2008 to 2015 were obtained from the National Tax Survey database. The National Tax Survey is completed by the Ministry of Finance and the State Administration of Taxation using the stratified random sampling method (Gao & Mao, 2013). Compared to the firm-level data of the Chinese Industry Census (CIC) widely used in the existing literature, the National Tax Survey dataset has the following three advantages. First, the sample of firms is

rich and includes a large number of SMEs. Second, the period is relatively recent and covers only the period when the number of banks has expanded rapidly. Third, the data quality was more accurate and reliable. The database is compiled by the tax department according to the firm's tax payment. As they need to fill in multiple financial statements, the firm must crosscheck the data of each statement to meet the accounting standards and to ensure the authenticity of the data. To measure the impact of the expansion of small and medium-sized banks on the operating conditions of large state-owned banks more accurately, we obtain detailed branch-level financial information (e.g., balance sheets, income statements, and cash flow statements) of 11,671 branches of large state-owned banks across the country from the National Tax Survey database.

#### 3.3. Bank branch loan data

The third dataset from 2008 to 2015 covers 1,749,819 loan contracts from approximately 220 banks and 104,227 firms in six cities randomly selected from a province in China. This includes detailed loan-level characteristics (e.g., loan amounts, issuing dates, loan maturity dates, guarantee ways, and loan delinquency statuses), bank information (e.g., names and locations of branches), and firm-level fundamentals (e.g., size, location, industry, and number of workers). It is worth mentioning that the loan data we use include both large and small loans borrowed by firms of all sizes, not only large-scale firms but also SMEs. The dataset was collected by the banking supervision department of the province, so the data quality was accurate and reliable. Additionally, the six cities covered by the dataset are random samples from the province, which have a good representation (Song, Wu, & Qian, 2016; Yin, Qian, & Wu, 2015). As this study examines the impact of the expansion of small and medium-sized banks on large state-owned banks, we retain 682,744 loan transaction samples from five big bank branches in the six regions, which provides support from the credit market to explain the response of large state-owned banks to intensified competition in the banking industry.

### 4. Empirical analysis

#### 4.1. Fixed effect analysis

We begin by estimating the impact of the expansion of small and medium-sized banks on the operating conditions of large state-owned banks based on a two-way fixed effect model. Formally, we estimate the basic empirical specification as follows.

$$Y_{it} = \alpha + \beta \text{Branch}_{ct} + \phi Z_{ct} + \gamma X_{it} + \delta_i + \lambda_t + u_{it} \quad (1)$$

Where  $Y_{it}$  is the logarithm of the operating income of branch  $i$  of large state-owned banks in year  $t$ , and is used to measure the operating condition of the branch.  $\text{Branch}_{ct}$  is the number of small and medium-sized bank branches in city  $c$  in year  $t$ , and its coefficient  $\beta$  measures the impact of the expansion of small and medium-sized banks on the operating conditions of large state-owned banks, which is the core parameter we focus on. The city-level control variable  $Z_{ct}$  includes GDP, population size, public financial expenditure, and city financial development, measured using RMB funds by financial institutions. We also control for the branch-level variable  $X_{it}$  which denotes the asset size of each branch  $i$ . Moreover, we control for branch ( $\delta_i$ ) and year ( $\lambda_t$ ) fixed effects. The descriptive statistics of the variables are presented in Table 1.

The regression results are presented in Table 2. Column (1) only has controls for branch ( $\delta_i$ ) and year ( $\lambda_t$ ) fixed effects, without adding any control variables. Column (2) adds a series of control variables at city level based on Column (1). Column (3) includes the branch-level control variable based on Column (2). Although the absolute value of coefficient  $\beta$  decreases with the gradual addition of control variables, it is always significant at the 1% level in Columns (1) to (3). In Column (3), the



**Table 1**  
Descriptive statistics of variables.

| Variables                 | Obs.   | Mean     | Std. Dev. | Min     | Max     |
|---------------------------|--------|----------|-----------|---------|---------|
| Ln (Operating income)     | 27,755 | 9.8688   | 4.6191    | 0       | 20.3076 |
| $Branch_{ct}$             | 27,755 | 107.8964 | 159.8466  | 0       | 1090    |
| GDP                       | 27,755 | 15.8666  | 1.4130    | 12.3211 | 19.3305 |
| Population                | 27,755 | 5.0074   | 0.9942    | 2.7147  | 7.6635  |
| Public expenditure        | 27,755 | 13.8845  | 1.3693    | 10.6033 | 17.9145 |
| Use of RMB funds          | 27,755 | 15.9255  | 1.6532    | 12.2685 | 20.0957 |
| Ln (Asset size of branch) | 27,755 | 11.0215  | 6.5216    | 0       | 23.4282 |

**Table 2**  
Fixed effect analysis.

| Variables     | (1)<br>Ln (Operating income) | (2)<br>Ln (Operating income) | (3)<br>Ln (Operating income) |
|---------------|------------------------------|------------------------------|------------------------------|
| $Branch_{ct}$ | 0.0034***<br>(0.0007)        | 0.0031***<br>(0.0007)        | 0.0017***<br>(0.0005)        |
| $Z_{ct}$      | NO                           | YES                          | YES                          |
| $X_{it}$      | NO                           | NO                           | YES                          |
| Branch FE     | YES                          | YES                          | YES                          |
| Year FE       | YES                          | YES                          | YES                          |
| Observations  | 27,755                       | 27,755                       | 27,755                       |
| R-squared     | 0.6019                       | 0.6031                       | 0.7805                       |

Notes: Standard errors in parentheses are clustered at the city level. \* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The same below.

coefficient is 0.0017 with significance at the 1% level, which means that the expansion of the number of branches of small and medium-sized banks significantly increases the operating income of the branches of large state-owned banks by 0.17%.

The regression results of the fixed effects model show that the expansion of branches of small and medium-sized banks is beneficial to the operating conditions of large state-owned banks, which increases their operating income. However, there may be other explanations for the regression results. First, other factors may affect both the increase in the number of small and medium-sized bank branches and the operating conditions of large state-owned banks, which are omitted from the regression. Second, cities where the branches of large state-owned banks with better operating performance are located may be more likely to attract more small and medium-sized banks. These two omitted variables and reverse causality may cause endogeneity problems in fixed-effect regression. For the problem of omitted variables, the fixed-effect regression performed a detailed treatment. On the one hand, a series of variables that may affect both the expansion of small and medium-sized banks and the operating performance of large state-owned banks are controlled in the fixed effect model, including the city's GDP, population size, public financial expenditure, financial development, and asset size of each branch. On the other hand, we also control for branch ( $\delta_i$ ) and year ( $\lambda_t$ ) fixed effects, which capture unobservable factors of branches and unobservable changes over time.

However, the problem of omitted variables remains. For example, factors such as the relationship networks of large state-owned banks are difficult to measure and cannot be controlled in the model, which may lead to an underestimation of the above regression results. Specifically, small and medium-sized banks may avoid cities with better relationship networks of large state-owned banks to prevent direct competition when choosing locations to enter. However, large state-owned banks in cities with better relationship networks tend to have better operating performance. Additionally, a city with large state-owned banks with better operating conditions may have a better economic level and higher financial development efficiency. Cities with a good financial market environment are more likely to attract more small and medium-sized banks to settle, increasing the number of small and medium-sized

bank branches in the city. This reverse causality problem may cause overestimation of the regression results. Consequently, theoretical analysis cannot determine whether the regression results underestimate or overestimate the true value because of potential endogeneity issues.

#### 4.2. Instrumental variable analysis

An effective solution to the endogeneity problem is to find an instrumental variable (IV) for the endogenous variable. An effective instrumental variable needs to satisfy both correlation and exogeneity; that is, it affects the number of small and medium-sized bank branches as the endogenous variable but does not directly affect the operational performance of large state-owned banks as the explained variable. Following Goldsmith-Pinkham, Sorkin, and Swift (2020) and Borusyak, Hull, and Jaravel (2022), we use the policy shock of the 2009 deregulation of branch openings for joint-stock banks and city commercial banks to construct an instrumental variable for the number of small and medium-sized bank branches. In the cross-sectional dimension,  $Treat_c$  represents the number of types of joint-stock banks and city commercial banks owned by city  $c$  before 2009 to quantify the different treatment intensities that city  $c$  receives.<sup>2</sup> In the time dimension,  $After_t$  is equal to one for years after 2009 and is equal to zero for years before 2009. Therefore, the interaction item  $Treat_c \times After_t$  measures the effect of the 2009 deregulation policy. In terms of the correlation of the instrumental variable, the 2009 deregulation significantly reduced the difficulty for small and medium-sized banks to set up branches in deregulated cities, which led to an increase in the number of small and medium-sized banks. Meanwhile, the 2009 deregulation policy was mainly decided by the banking regulatory department rather than large state-owned banks, which means that the policy shock in 2009 was relatively exogenous to the operating performance of the branches of large state-owned banks. In summary, the interaction item  $Treat_c \times After_t$  satisfies the two conditions of the instrumental variable.

Table 3 presents the results of the instrumental variable regression. The estimation result in Column (1) shows that the 2009 deregulation policy has a significant expansion effect on the number of branches of small and medium-sized banks, which demonstrates the correlation of the instrumental variable. The results in Column (2) show that the expansion of small and medium-sized banks significantly increases the operating income of the branches of large state-owned banks by 1.07%. Compared with the regression results of the fixed effect model in Table 2, the estimated coefficients of the number of small and medium-sized banks in Table 3 are numerically larger and have the same level of significance, indicating that the potential endogeneity problem underestimates the positive impact of the expansion of small and medium-sized banks on large state-owned banks. A possible explanation is that the fixed effects model has the problem of omitted variables, not including difficult-to-measure factors, such as the relationship network of large state-owned banks, as mentioned before. Specifically, the branches of large state-owned banks in the city, where large state-owned banks have established a strong relationship network with the local government and firms have better operating performance, make it more difficult for new small and medium-sized banks to enter the city to

<sup>2</sup>  $Treat_c$  is calculated as: Prior to the 2009 deregulation, the number of types of joint-stock banks and city commercial banks in the city plus the number of types of joint-stock banks in the capital city of the province where the city is located and the number of headquarters of city commercial banks in this province. For example, there are 3 branches of Shanghai Pudong Development Bank and 2 branches of Chengdu Bank in non-capital city A. In addition to Shanghai Pudong Development Bank, the capital city of province S where city A is located, has branches of 5 other joint-stock banks. Moreover, the headquarters of 4 other city commercial banks besides Chengdu Bank are located in this province S. According to the above calculation rule, the  $Treat_c$  of the city A is calculated as  $1 + 1 + 5 + 4 = 11$ .

**Table 3**  
Instrumental variable analysis.

| Variables                    | (1)                   | (2)                            | (3)                            |
|------------------------------|-----------------------|--------------------------------|--------------------------------|
|                              | First Stage           | IV                             | Reduced Form                   |
|                              | $Branch_{ct}$         | $\ln(\text{Operating income})$ | $\ln(\text{Operating income})$ |
| $Treat_c \times After_t$     | 1.0892***<br>(0.2942) |                                | 0.0197***<br>(0.0048)          |
| $Branch_{ct}$                |                       | 0.0107***<br>(0.0039)          |                                |
| Controls                     | YES                   | YES                            | YES                            |
| City FE                      | YES                   | NO                             | NO                             |
| Branch FE                    | NO                    | YES                            | YES                            |
| Year FE                      | YES                   | YES                            | YES                            |
| First stage F-stat           |                       | 309.47                         |                                |
| Kleibergen-Paap LM-stat      |                       | 252.198                        |                                |
| p-value of the under-id test |                       | 0.0000                         |                                |
| Observations                 | 2261                  | 27,755                         | 27,755                         |

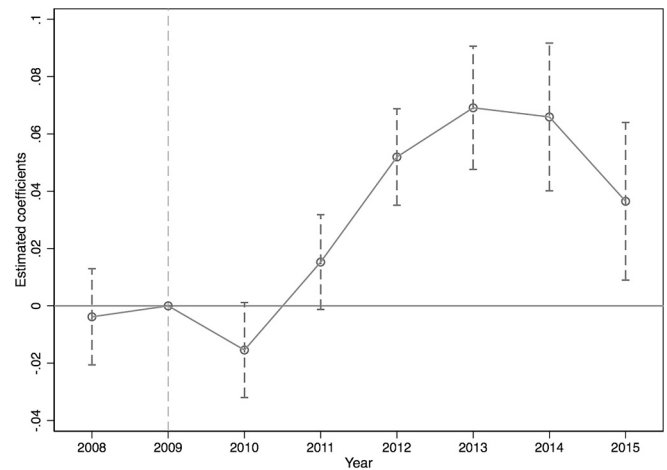
compete with large state-owned banks. Thus, small and medium-sized banks strategically choose to enter cities where the development of large state-owned banks is relatively weak, which may lead to the underestimation of the OLS regression results in Table 2.<sup>3</sup> Besides, following Bai and Jia (2016) and Chen, Kung, and Ma (2020), we report the validity of the instrument in Table 3. We can see that the first stage F-statistics is above 10, implying that our instrumental variable is not weak. This is also confirmed by the p-value of the under-identification test reported in Table 3, which satisfies  $<0.01$ . Column (3) of Table 3 reports the reduced-form result and shows that under the shock of the 2009 deregulation policy of small- and medium-sized banks, the operating income of the branches of large state-owned banks increased significantly by 1.97%.

## 5. Robustness tests

### 5.1. Discussion on the exogeneity of IV

The above uses the instrumental variable method to estimate the impact of the number of small and medium-sized banks on the operating income of large state-owned banks, and the method of constructing the instrumental variable takes advantage of the impact of the 2009 deregulation policy on the number of small and medium-sized banks. The instrumental variable interaction term  $Treat_c \times After_t$  is a difference-in-differences (DID) strategy. Therefore, we further discuss the exogeneity of this instrumental variable based on the parallel trend test using the DID method. The DID method requires that the treatment and control groups have the same time trend before 2009 deregulation. As shown in Fig. 3, we take 2009 as the base period, and the estimated coefficient of the year before policy implementation is not significantly different from 0. This shows that there were no significant differences in the pre-trends for branches of large state-owned banks in deregulated cities (i.e., treated groups) and regulated cities (i.e., control groups), meaning that the instrumental variable we used is relatively exogenous. That is, before the 2009 policy, there was no significant correlation between the deregulation policy of small and medium-sized banks and the operating income of large state-owned banks. With the passage of

<sup>3</sup> Referring to Gao et al. (2019), we use CBIRC branch data to generate a city-bank-year level data structure. After controlling for the fixed effects of city, bank, and year, it is found that the number of branches of large state-owned banks in a city have a significant negative impact on the entry of small and medium-sized banks. To a certain extent, this illustrates that small and medium-sized banks may strategically enter cities where the development of large state-owned banks is relatively weak, resulting in an underestimation of the OLS regression results compared with the results of IV.



**Fig. 3.** Parallel Trend Test.

Notes: The hollow point is the point estimate of the coefficient for each period, and the vertical dotted line is the confidence interval at the 95% significance level.

time after the implementation of the 2009 deregulation policy, the expansion of the number of small and medium-sized banks significantly increased the operating income of large state-owned banks.

### 5.2. The placebo test

To test whether our baseline empirical results are driven by other factors, we repeat the main regression process by using a sample of policy banks as a placebo test. The impact of the expansion of small and medium-sized banks on large state-owned banks is essentially because joint-stock banks, city commercial banks, and large state-owned banks are all commercial banks, and there are many overlaps in the main businesses of these three types of banks. The expansion of small and medium-sized banks changes the banking industry's market structure and intensifies competition among banks, which has a certain impact on large state-owned banks. China's banking system includes policy banks, such as the Agricultural Development Bank of China, the Export-Import Bank of China, and the China Development Bank. Unlike commercial banks, policy banks are not for profit-making purposes; they only handle policy-related banking businesses to implement and cooperate with the government's social and economic policies. We use a sample of policy banks to perform a two-way fixed-effect regression and an instrumental variable regression. In theory, the coefficients in the regression of policy banks are not significant. As shown in Panel A of Table 4, the regression results obtained by the two-way fixed effect and instrumental variable are not statistically significant, indicating that the expansion of small and medium-sized banks does not impact policy banks. Consequently, it can be considered that the baseline regression results in this study were not caused by other omitted factors.

### 5.3. Excluding other fiscal policy effects

In response to the 2008 Global Financial Crisis, Chinese central government enacted a 4-trillion-yuan stimulus plan. To cooperate with the implementation of the stimulus package and help local governments raise funds, the central government relaxed the restrictions on local government financing platforms (LGFPs) and bank credit. In 2008, there were >3000 LGFPs nationwide, and the number of LGFPs increased to >8000 in 2009 (Lan, 2021; Liu, Cao, & Ma, 2020). As the implementation of the 4-trillion-yuan stimulus plan is within the time interval studied in this paper, the concern that fiscal policy during the same period may impact the results of the baseline regression is exacerbated. Based on the list of LGFPs provided by the CBIRC, we obtained a

**Table 4**  
Robustness tests.

| Variables  | (1)<br>Two-way fixed effects | (2)<br>IV             |
|--|------------------------------|-----------------------|
|  | Ln (Operating income)        | Ln (Operating income) |
| Panel A: Placebo test: policy bank sample              |                              |                       |
| $Branch_{it}$  | 0.0013<br>(0.0019)           | −0.0076<br>(0.0141)   |
| First stage <i>F</i> -stat                             |                              | 23.72                 |
| <i>p</i> -value of the under-id test                   |                              | 0.0000                |
| Observations   | 2739                         | 2739                  |
| Panel B: Control the 4-trillion-yuan stimulus plan     |                              |                       |
| $Branch_{it}$  | 0.0019***<br>(0.0006)        | 0.0154**<br>(0.0076)  |
| First stage <i>F</i> -stat                             |                              | 77.26                 |
| <i>p</i> -value of the under-id test                   |                              | 0.0000                |
| Observations   | 26,733                       | 26,733                |
| Panel C: Exclude the Agricultural Bank of China sample |                              |                       |
| $Branch_{it}$  | 0.0019***<br>(0.0006)        | 0.0108**<br>(0.0047)  |
| First stage <i>F</i> -stat                             |                              | 170.93                |
| <i>p</i> -value of the under-id test                   |                              | 0.0000                |
| Observations   | 19,661                       | 19,661                |
| Panel A, B and C: Control                              |                              |                       |
| Controls   | YES                          | YES                   |
| Branch FE  | YES                          | YES                   |
| Year FE  | YES                          | YES                   |

relatively complete list of LGFPs from the Wind database. Referring to [Liu et al. \(2020\)](#), according to the platform names and the organization codes, we obtain information on the establishment time and locations of LGFPs through several enterprise information query websites. We further sort out the number of LGFPs owned by cities across the country for each year from 2008 to 2015 and add this variable to the baseline regression as a city-level control variable to exclude the impact of the fiscal stimulus policy. Panel B in [Table 4](#) reports the regression results after controlling for the 4-trillion-yuan stimulus plan. Both the two-way fixed effects and instrumental variable results are consistent with the baseline regression results in [Tables 2 and 3](#), and the values are also very close, indicating that after excluding the interference of the 4-trillion-yuan fiscal policy in the same period, the main findings of this study are still robust.

#### 5.4. Excluding the impact of other banking events

The Agricultural Bank of China conducted non-performing loan stripping before listing in November 2007, which reduced its non-performing loan ratio by 19.3% that year. There is a large difference in the caliber of the loan data before and after the stripping of non-performing loans. To confirm that the main empirical results of this study are not affected by this important event in the banking industry, we removed the sample from the Agricultural Bank of China and used the data of the other four large state-owned commercial banks to regress. Panel C in [Table 4](#) shows that the regression results after excluding the interference of important events in the banking industry during the same period still support the main findings of the baseline regression in this study; that is, the expansion of small and medium-sized banks improves the operating income of large state-owned banks, demonstrating the robustness of our findings.

#### 6. Mechanism analysis

Having used several methods and robustness tests to demonstrate that the expansion of the number of small and medium-sized banks

increases the operating income of large state-owned banks, we now turn to understanding the mechanism. Specifically, in the face of competition from small and medium-sized banks, do large state-owned banks increase their operating income mainly due to the rise in the total loan amount by reducing the loan interest rate, or by relaxing the loan mortgage standards to issue riskier loans? Alternatively, actively exploring new customers to achieve growth in total loan amount? In this section, we use bank branch loan data to examine each channel.

First, we explore the impact of the expansion of small and medium-sized banks on the interest rate per loan (price), the amount per loan, and the total loan amount per year (quantity) of the branches of large state-owned banks. The regression results in [Table 5](#) show that banking competition caused by the deregulation of small and medium banks does not affect the interest rate per loan of large state-owned banks. For quantity, although the amount per loan is reduced by 0.25%, the total annual loan amount increases significantly by 1.46%. This means that, in the face of intensified competition, large state-owned banks mainly increase their operating income by expanding the total number of loans instead of reducing the loan price. One possible reason for this is that the loan interest rate is still not fully marketized and is subject to the price guide of the People's Bank of China, so there is not much room for the bank to adjust its loan interest rate level.

Further, we examine whether the growth in the total annual loan amount of large state-owned banks is achieved by lending to more new firms or by increasing the credit lines of old customers. The regression coefficients in [Table 6](#) show that with intensification of competition, the number of firms served by large state-owned banks increases significantly, especially the number of SMEs served. This means that the entry of small and medium-sized banks intensifies competition in the credit market, making large state-owned banks continue to expand the market, actively tap more potential new customers, and issue loans to new firms. In particular, large state-owned banks started to develop a credit market for SMEs, which was less involved in the past, thus alleviating the problem of financing difficulties for SMEs to a certain extent. It explores new businesses that bring higher revenues to large state-owned banks. Therefore, the increase in the total loan amount of large state-owned banks is mainly through the extensive margin, rather than the intensive margin.

To cope with competition, large state-owned banks increase their operating income by serving more firms, especially SMEs. To serve more firms, banks must collect more firm information and review relevant qualifications. Does this increase the costs of large state-owned banks? As the results in [Table 7](#) show, the continuous development of new markets significantly increases the operating costs of large state-owned banks but does not reduce their operating profit margins. In general, large state-owned banks are actively developing new customers, especially by establishing cooperative relationships with more SMEs, which increases the operating costs of large state-owned banks, but also increases their revenue and does not significantly affect their profit margins.

Finally, competition from small and mid-sized banks boosts large state-owned banks' operating income, but is the increase in revenue generation achieved through risking loan issuances? That is, in the face of the expansion of the number of small and medium-sized banks, large state-owned banks may employ looser credit review standards and issue

**Table 5**  
Impact on the loan interest rate and loan amount of large state-owned banks.

| Variables     | (1)<br>Interest rate per loan | (2)<br>Amount per loan | (3)<br>Total loan amount |
|---------------|-------------------------------|------------------------|--------------------------|
| $Branch_{it}$ | 0.0313<br>(0.0193)            | −0.0025**<br>(0.0011)  | 0.0146***<br>(0.0037)    |
| Controls      | YES                           | YES                    | YES                      |
| Branch FE     | YES                           | YES                    | YES                      |
| Year FE       | YES                           | YES                    | YES                      |
| Observations  | 671,614                       | 671,614                | 240                      |

**Table 6**

Impact on the number of firms served by large state-owned banks.

| Variables                  |                        | (1)<br>Number<br>of firms | (2)<br>Number<br>of SMEs | (3)<br>Number of<br>large firms |
|----------------------------|------------------------|---------------------------|--------------------------|---------------------------------|
| <i>Branch<sub>it</sub></i> | 29.1219***<br>(5.0095) | 25.7396***<br>(4.5149)    | 3.3824***<br>(0.5203)    |                                 |
| Controls                   | YES                    | YES                       | YES                      |                                 |
| Branch<br>FE               | YES                    | YES                       | YES                      |                                 |
| Year FE                    | YES                    | YES                       | YES                      |                                 |
| Observations               |                        | 240                       | 240                      | 240                             |

**Table 7**

Impact on the cost and profit of large state-owned banks.

| Variables                  | (1)<br>Operating cost | (2)<br>Operating profit margin |
|----------------------------|-----------------------|--------------------------------|
| <i>Branch<sub>it</sub></i> | 0.0111***<br>(0.0041) | 0.0011<br>(0.0008)             |
| Controls                   | YES                   | YES                            |
| Branch FE                  | YES                   | YES                            |
| Year FE                    | YES                   | YES                            |
| Observations               | 27,706                | 27,164                         |

more non-performing loans to achieve higher operating income. The results of Panel A in Table 8 show that, under intensified competition, large state-owned banks do not change the guarantee requirement and default rate of each loan. This means that, while expanding the scale of loans, large state-owned banks do not lower the lending standards for each loan, so they do not deteriorate the quality of loans or increase their operating risks. In addition, the results in Panel B of Table 8 illustrate that large state-owned banks provide more lending support to SMEs without lowering their lending standards. In summary, competition does not lead large state-owned banks to take risking actions such as relaxing lending standards or issuing more subprime loans. Instead, large state-owned banks employ a prudent and de-risking expansion strategy to explore potential markets to deal with the expansion of small and mid-sized banks.

## 7. Conclusion and policy implications

It is important for the Chinese banking industry to promote the strategic transformation of large state-owned banks and develop small and medium-sized banks; to solve difficult and expensive financing and improve financial services to the real economy. This study is the first to use bank branch-level operating performance and micro-level data to identify the impact of the expansion of small and medium-sized banks on large state-owned banks using the 2009 exogenous policy shock of the relaxation of branch openings for small and medium-sized banks, providing empirical evidence for the development of financial institutions to support the real economy. It is found that the expansion of small and medium-sized banks significantly increases the operating income of large state-owned banks by 1.07%. Further mechanism analysis shows that increased competition in the banking industry does not reduce the cost of credit but significantly increases the availability of corporate credit. On the one hand, competition makes large state-owned banks continue to open up new markets, especially by providing credit support for more SMEs, which solves financing difficulties for SMEs to a certain extent. However, competition does not lead to risking behavior by large state-owned banks to lower lending standards and create non-performing loans. In conclusion, this study finds that vigorously developing small and medium-sized banks does not worsen the operating conditions of large state-owned banks but also significantly improves the financing difficulties of SMEs through spillover effects.

In terms of policy inspiration, this study finds that the entry of small

**Table 8**

Impact on the lending standards of large state-owned banks.

| Variables                  | (1)<br>Guarantee requirement | (2)<br>Default rate |
|----------------------------|------------------------------|---------------------|
| Panel A: Full sample       |                              |                     |
| <i>Branch<sub>it</sub></i> | −0.0009<br>(0.0008)          | 0.0001<br>(0.0003)  |
| Observations               | 671,614                      | 671,614             |
| Panel B: Sample of SMEs    |                              |                     |
| <i>Branch<sub>it</sub></i> | −0.0009<br>(0.0007)          | 0.0003<br>(0.0004)  |
| Observations               | 475,956                      | 475,956             |
| Panel A and B: Control     |                              |                     |
| Controls                   | YES                          | YES                 |
| Branch FE                  | YES                          | YES                 |
| Year FE                    | YES                          | YES                 |

and medium-sized banks, such as joint-stock commercial banks and city commercial banks, can create a more dynamic and healthy competition for the Chinese banking industry, which provides a realistic basis for banking reform. It is feasible to gradually solve the problem of insufficient supply in the loan market by improving the supervision system of small and medium-sized financial institutions and allowing small and medium-sized financial institutions to enter the market and compete.

Although this study estimates the impact of competition on large state-owned banks based on micro data, some questions still need to be answered. Further research can explore the impact of SMEs after the deregulation on SMEs. This study finds that the intensified competition in the banking industry brought about by the expansion of small and medium-sized banks can solve the problem of financing difficulties for SMEs. Does the improvement in credit availability affect the economic behavior? Promoting firms to expand production investment and increase employment. This question can provide inspiration for the development of the financial industry for the policy goals of stabilizing investment and employment in the current macro environment. Moreover, after deregulation, the interaction between large state-owned banks and small and medium-sized banks has improved the availability of credit, which positively impacts the production and operation of firms; however, this competition may cause small and medium-sized banks to take too many risks.<sup>4</sup> In future research, we wish to examine the general equilibrium effect of bank deregulation comprehensively.

## Declaration of competing interest

None.

## Data availability

Data will be made available on request.

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<sup>4</sup> In 2020, Baoshang Bank was declared bankrupt by the central bank, which aroused the public's attention to the risk-taking of banks, that is, whether excessive competition among banks has led to the increase of operating risks of small and medium-sized banks.



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