

Structural changes in the banking industry and the Generation of small and medium enterprises: An empirical study based on China's 1998-2013 industrial enterprise data

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Abstract

Currently, the development of the small and medium enterprises has attracted attention from various fields. And many researchers are working on solve two main problems SMEs met, namely the limited credit availability and the high funding cost. This dissertation studies these problems from the perspective of the banking industry. By taking an empirical test on industrial enterprise data of China, an inverted U shape relationship has been found between the generation of the SME and banking structure. The empirical result also indicates state-owned economy and industry structure could affect SME generation, too. The policy implication of this essay is to optimize the banking industry structure and support the small and medium banks to support SME funding. Meanwhile, it is important to maintain regional financial stability by preventing the risk of excessive competition in banking market.

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1 Introduction

Small and medium enterprises (abbreviated as SME below) and private economy have played a very crucial role in the economic and social development of China. They are cornerstones of the modern economic system and the engines of the high-quality economic growth. More specifically, over 50% of tax revenue, 60% of GDP, 70% of technical innovation, 80% of urban employment and 90% of enterprises are contributed by SMEs and private economy. However, there are still some institutional barriers and practical difficulties exist that could hinder the development of the SME and private economy. The two most prominent problems are lacking credit availability and high funding cost, which together caused a mismatch between the economic importance of SME and the financial support they obtained. Especially considering some recently emerged negative factors such as the complex economic environment of China caused by the economic downturn, the de-leverage process of the economy and the trade war between China and U.S, the credit crunch for SMEs are even severed. Consequently, the daily operations and further growth of SMEs are influenced negatively. These problems are concerned by many, so the development of the SME and their financing difficulties are becoming a lively topic in the research area recently.

Banking industry is the major provider of financial services for SME. On one hand,

banking credit is the main channel of social financing. On the other hand, SME can hardly get financing support from the capital market. SO, the financial supports to SME mainly rely on the banking credit and banks, certainly, are supposed to take more efforts in helping SME with financing difficulties. There are some similar voices from financial supervisors in China recently. For instance, the president of People's Bank of China, the central bank of the country, has put a policy to increase credit for SME and private enterprises. Likewise, the chairman of China Banking and Insurance Regulatory Commission revealed a quantitative objective in terms of SME loans, that is, for big banks, the loans to SME should be no less than 1/3 of their newly increased loans and for the small and medium banks(abbreviated as SMB below), the required ratio is increased to 2/3. Further, in three years, the same ratio for the entire banking industry should be no less than 1/2. In response, commercial banks in China have put a series of policies to improve financial services provided to SME. In conclusion, given the background

stated above, the research on the financial support to SME provided by banks is both practical and meaningful.

But no matter from the level of supervisors or commercial banks, little consideration has been taken from the perspective of optimizing the banking market structure. However, this can be a very enlightening idea which is easily neglected by many. In academic fields, limited articles can be found to study the relationship between the banking industry structure and the real economy and no consensus has yet been reached in this area. Since the application of reform and open policy, China economy has been growing in a quite high speed and the economic system of the country has been revolving too. Consequently, the banking industry in China has also witnessed profound changes in these years, and one major change is related to the market structure of the banking industry. (Liu,2009). From a 'one fits all' system to dual system, then to a prosperous market composed of policy banks, state-owned banks, joint-equity commercial banks, city commercial banks, rural commercial banks, private banks and many other relevant bank institutions. Nowadays, a highly sophisticated financial system mainly lead by Banks has been established in China. (Li,2009) The magnificent development and dramatic structural change in China have made a profound influence on its rapid economic growth. This process has provided a rare opportunity for researchers to study the relationship between the banking industry structure and the real economy. Meanwhile, in order to support SME and provide them better financing service, a series of questions are worth thinking: How to complete the composition of the banking industry in China? How to bring the unique advantages of big and small banks into full play respectively? Is there an optimal structure in the banking industry and if so, how to reach that optimal situation? These are not only theoretical problems but may also bring practical supports for the reform in the banking industry. For example, Lin et al.(2006,2008) put a 'optimal financial structure' hypothesis based on theory of comparative advantage : based on the fact that the match level between financial structure and economic structure has a great impact on economic, since the economy in China is mainly composed of labour intensive SME, then SMBs should be able to provide financial services more effectively than big banks. So that the optimal financial structure in China should be dominated by SMBs.

The academic contributions of this essay include the following four parts: Firstly, articles related to this area are hard to find in China and those can be found are mostly published before 2006. Given that province level banking industry data is hard to access by that time and a change in the definition of SME happened after that time, the robustness of existing empirical research is not enough in the current

situation. The research in this essay, in some way, could supplement the defects of existing research. Secondly, the study in this essay has a lot of practical implications, given the background that many policies are put to support the SME, the conclusion of this essay can provide clear-cut advice on the banking industry reform. Thirdly, the conclusion of this essay is innovative in that finding there is an inverted U shaped relationship between banking industry structure and the development of SME, rather than a one-way linear relationship, whether negatively or positively, suggested by previous studies. This largely enriched and developed the existing researches. Last but not least, this essay offers a realistic and relatively rational explanation of the result from a micro level by interpreting the result from multiple perspectives such as bank-firm relationship, credit cost and financial risk. By doing so, the conclusion of this essay is much more persuasive and reliable.

In the following sections, this essay will firstly review some articles in relevant areas and then will make some hypothesis to design the model. Next, empirical tests will be taken with different models and the empirical results will be analyzed by the author. Finally, some conclusions and suggestions will be put based on the empirical results.

2 Literature review

2.1 empirical researches related to SME generation

No matter from which aspects, the impacts of banks on SME will eventually be reflected by the entry and exit behaviours of SME in the market. Therefore, the generation of the SME is a quite comprehensive measurement of the banks' influence on SME. Cetorelli (2004) has studied the influence on the scale of manufacture firms caused by structural changes in the banking industry in 28 OECD countries. He finds that countries with a more concentrated market are more dependent on external funding. Also, the relaxation of banking supervision in EU has decentralized the banking industry, improved the generation of SME. Cetorelli and Strahan (2006) argue that the more concentrated the banking market, the severer the monopoly in the market. Consequently, new entrants in the financial department will find it more difficult to get loans and the low availability of credit will, in turn, impede the generation of SME.

Bertrand et al. (2007) further explore the micromechanism, empirical results reveal that when the concentration of the banking industry lowered, through optimizing

the credit allocation, more credit support is offered to new entered SME. As a result, the industry entering ratio and overall economic efficiency have witnessed a significant increase. Hasan et al. (2015) test the influence of banking industry structure on the SME, using the 1997-2008 data in 27 provinces and 4 municipalities directly under the Central Government. They conclude that big banks have a negative impact on local SME. Lei and Peng (2010) use the panel data in China from 1995 to 2006 to study the same topic and constructed an instrumental variable based on the incremental reform of the banking industry. They find the increase of the SMBs' market share has improved the generation of the SME. Wu and Jia (2016) analyze the issue from the perspective of the entry and exit behaviours of heterogeneous enterprises and find the development of the expansion of SMBs could encourage the SME to enter the market and lower their exit risk, thus push the exit of the zombie enterprises. However, there are some different empirical results, too. Black and Strahan (2002) conduct empirical research using the exogenous shocks caused by bank merger, their result indicates that the decrease of the small and medium bank's market share has actually increased the generation ratio of new firms. The authors explain the result by arguing that larger scale of the bank can lower the operating cost and delegated monitoring cost. Francis et al. (2007) further study the change of local firm generation caused by bank mergers in the United States. Although in the short run, bank mergers as a whole (market concentration) has a negative relationship with firm generation, the mergers between small banks and medium banks have a positive impact on firm generation. On the long run, the mergers between big banks and small banks have a positive impact, too.

2.2 How do banks influence SME

Levine (2005) summarizes the channels through which the banking industry can support the growth of the economy, including savings accumulation, information transfer, risk diversification, resource allocation and supervision of firms. For SME, their core connection with banks is credit financing. So the existing studies mostly regard credit availability as the influence mechanism, but no consensus has yet reached. On one hand, a relatively traditional point of view is 'market power hypothesis', which deems the increase of market competition will improve the credit availability of the firms. (Cestone and White, 2003) and several studies in favour of this view (Cetorelli, 2003; Cetorelli and Strahan, 2006; Chong et al, 2013), Love and Perí'a (2014) use cross countries data from 53 countries to conduct their system test and found that a more competitive banking market can significantly increase the credit availability of firms. Li et al. (2016) investigate and study the SMBs' influence on SME's financing in China at a micro level. They

find the development of the SMBs largely narrowed the gap between large enterprises and SME in terms of financing. Yao and Dong(2015) test the impacts of financial development level and financing structure on financial constraints of SME. They argue that financial structure change can significantly alleviate the financial constraints of SME. But Zhu(2017) gets a different conclusion by analyzing the data from the World Bank and China Banking Regulatory Commission. The author argues that the increase in banking competition has not caused a significant improvement on the credit availability of SME.

On the other hand, the information hypothesis believes monopoly market can improve the credit availability of SME. Petersen and Rajan (1995) conduct a pioneering study, the result of which indicates that newly entered SMEs with no past record, in a monopoly like banking market, will have better credit availability. Also, the credit costs for them tend to be lower. The rationale is that banks may take a more friendly credit policy toward new entrants by lowering the interest rate and increasing the number of loans. Thus, more SMEs will be attracted to the market and when these newly entered SMEs became successful, banks can raise the interest rates charged from those firms on the base of good relationships built before, making up the credit risk and losses incurred in the earlier stage.

Besides, a number of articles have explored the influence mechanism through credit cost risk diversification, resource allocation and company supervision and governance. Chen(2006) researches from the perspective of industrial organizational theory and find no evidence, neither theoretical nor empirical, that supports the advantage of a diversified banking industry structure. On contrary, a concentrated market tends to be a better choice in terms of bank efficiency, financial stability, SME financing and resource allocation. As for credit cost, Yin et al.(2015) , by analyzing regional SME micro-credit data in China, find banking competition has a significant negative impact on credit cost while the bank-firm relationship has a positive impact. Li(2002) regards high credit cost as a major obstacle for SME. Also, he argues that compared with big banks, SMBs have a cost advantage on providing financial services to SME. From the perspective of external supervision and governance, Dong and Cai (2016) argue that a competitive banking market structure benefits the research and development of firms, especially the small and medium ones. Tang and Wu (2016) focus on the R&D financing restriction relaxation caused by a competitive banking industry structure and stress the competition on monitoring ability between banks. They argue that competitive pressure from the market will drive banks to perform their responsibilities of supervision and assessment and enhance the risk control,

fulfilling the external governance mechanism. From the perspective of resource allocation, Liu and Yin think with the marketization of interest rate in China, small and medium financial institutions will face the challenge of risk management and asset quality deterioration. Meanwhile, large institutions will show advantages such as higher fund utilizing efficiency, better information screening and risk control. The empirical test conducted on 1995-2011 province level panel data supports their argument by indicating the rise of state-owned banks' market share has improved the upgrading of the industrial structure.

3 Theoretical hypothesis and model specification

3.1 SMBs have comparative advantages on servicing SME

Stiglitz and Weiss (1981) provides a classic explanation for the moral hazard and adverse selection problems of loans based on an information asymmetry situation. That is, as the intermediary of information and credit, banks have the economy of scale by cutting the information processing cost through the specialized division of labour. Based on the information processing method, bank lending technologies can be divided into transactional lending based on hard information and relationship lending based on soft information. Transactional lending makes lending decisions based on the standard financial information of firms. With highly standardized information production and information processing, this kind of lending tends to have a higher turnover but lower additional value. On the other hand, lending decisions in relationship lending are mostly based on soft information, which is the multi-dimensional information related to the firm and its operators. This kind of information is often gained from long-term communication and cooperation between banks and firms. So, soft information is difficult to observe, quantify or transfer and is non-standardized. Contrary to transactional lending, relationship lending has higher additional value but lower turnover. (Boot and Thakor, 2000; Berger et al., 2005; Cole et al., 2004)

On the part of SME, they have a severer information asymmetry problem compared with their larger peers. Due to the fact that little hard information of SME is available, soft information is more important to make credit decisions for banks. So, relationship lending is the main method used by the banks when dealing with SME loan business. SMBs, which are often regional banks, are likely to have advantages over large banks in terms of gathering soft information and making relationship lending because they are more familiar with local firms. (Kang, 2012) Thus, a specialization based on the scale is formed: large banks focus on making loans to large firms while SMBs focus on small and medium firms. (Lin and Sun, 2008)

To be more specific, there are several factors lead to the comparative advantages mentioned above. Firstly, large banks have cost advantages when dealing with standardized financial information for having more complete credit process, approval policy and background system. As for SMBs whose business scope is relatively concentrated, they have a cost advantage in terms of gathering soft information from local small and medium firms. This is because SMBs are more familiar with local economic development and social network. Secondly, SMBs have a simpler organizational structure. With fewer management levels take part in the lending process, the transaction cost of information is significantly lowered and soft information is utilized efficiently. Large banks, however, have stricter credit policies and more standard credit process, leading higher cost during the application of soft information. Lastly, SMBs have a tighter capital constraint and limited available funds while large firms often require a higher amount in one single loan. This limited SMBs' ability to provide corresponding financial services. Large banks, on the other hand, could make hard information based loans with higher amount and lower cost. Based on the above analysis, this essay makes the following hypothesis:

Hypothesis 1: *SMBs are more skilled at handle soft information and relationship lending. So, a higher market share of SMBs will improve the credit availability of small and medium enterprises, benefiting the generation of small and medium enterprises.*

3.2 Banking competition may have a negative influence on SME generation

For banks, the key to utilize soft information and make relationship lending is to build a long-term and stable relationship with SME. Once the competition among the banks intensified, the willing to build a long-term relationship with SME might be lowered. This is because the higher chance of losing clients will lower the probability of building a long-term relationship. Consequently, relationship loans made to SME will decrease and so do the credit supports provided to SME, hindering the generation of SME. On contrary, a more concentrated market structure will encourage banks to build a long-term relationship with SME. As a result, credit supply will increase and enterprise generation will be improved.

Besides, some researchers argue that with the increase of bank competition, there may exist a winner's curse. The lending process of banks is actually a risk screening mechanism, through which good firms are separated from bad ones. If there are many banks in the market, the chance that a bad firm could pass the credit

screening will be higher because they can apply for loans from other banks when refused by one. The higher the number of banks and the more competitive the market, the more likely this kind of winner's curse will occur. In the long run, this will raise the market interest rate and lower the credit supply. (Shaffer, 1998; Cao and Shi, 2000)

Hypothesis 2: *A higher level of banking market competition has a negative impact on SME generation.*

3.3 An inverted U shaped relationship exists between banking market structure and SME generation

Another relatively important factor is financial stability. Compared with large banks, SMBs are disadvantaged in terms of capital strength and credit scale. A diversified market may lead to excessive competition and bring potential financial risks. These financial risks will eventually transfer to the real economy, impeding the development of SME. This argument can be reasoned by three points. First, SMB faces a higher operational risk while are more vulnerable to risks. Unlike large banks, SMBs do not have enough capital strength and fund. As a result, they lack enough cushions to resist liquidity risk and credit risk. Second, the diversified market will lead to intense competition. With the impact of interest rate liberalization, this will increase the bankruptcy risk of SMBs. For example, during the interest rate liberalization in the United States, numerous SMBs failed to survive the risks brought by the reform. Finally, SMBs often lack mature company governance and their credit lending is more likely to be influenced by the non-market factors. A misallocation of resources may occur and eventually damage the credit availability of SME.

In conclusion, the impact of the banking industry structure on SME is determined by multiple factors. There is no consensus reached yet on the rationale behind this impact mechanism and empirical results are inconsistent. So, it is possible that the relationship between banking industry structure and SME is not a simple linear one. With the decentralization of the banking industry, the market share of SMB will increase when the banking industry moving from a monopoly market to a competitive one. This indeed will benefit the development of SME, but when the banking market continues decentralizing, competition will increase and hinder the development of the SME, as stated in hypothesis 2. To sum up, the optimal banking market structure for SME should be between high monopoly and free competition.

Hypothesis 3 : *there is an inverted U shape relationship between banking market structure and generation of SME.*

4 Empirical test

4.1 The measurement of banking market structure

Banking market structure is defined as the relationships among banks in terms of market share, business scale, number of institutions and the competition pattern determined by those relationships. In research, the concentrate level of market share is often used as an index to refer the market structure and the competition degree. Most articles believe a highly concentrated market will have low competition while decentralized market could bring adequate competition. For instance, Claessens and Laeven (2005) analyze the sample data from 17 countries and found there is a significant negative relationship between market concentration and competition. So, current researches often use market structure to reflect the competition pattern in the banking market. There are two indexes, CR4 and HHI, that are commonly used to measure the bank market structure, while branch number is sometimes used as an index for the same purpose in few articles. More specifically, CR4 is the total market share of the biggest four institutions' market share, the higher the CR4, the more concentrated the market and the higher the level of monopoly. Likewise, HHI is the sum of squares of each institution's market share. An HHI closer to 1 indicates a higher concentrated market and a higher level of monopoly.

This essay gathered 1998-2012 province level loan data(including short-term loan, middle and long-term loan, discounted notes and other loans) of 5 large commercial banks, 12 joint-equity commercial banks and 145 city commercial banks. Based on this data sample, CR4 and HHI of each province are calculated respectively. Because this data sample contains the vast majority of commercial bank assets in China, it can measure the province level banking market structure in a relatively precise measure. In the meantime, present articles are mostly focusing on the time period before 2004 because province level savings and loans data of commercial banks are no longer disclosed after that time. However, based on two concerns, this essay used 1998-2013 as research period. First, the author has gained the province level data of the 162 banks mentioned above from the People's Bank of China. Second, after the first national financial conference held in 1998, a series of market and commercial reforms have brought great changes in the banking market. The biggest four state-owned banks' market share in loan market decreased from 90% in 1998 to 44% in 2013. During this period, commercial

banks in China went through shareholding reform and commercial reform. The gradualness of reform and huge regional difference make the change of banking market structure a nearly random variable which is different on every single time-point and region. This fact has provided a good chance to conduct empirical tests to study the banking market structure's impact on SME development.

4.2 The measurement of SME generation

There are several ways to measure the generation of SME, this essay will use Birth Rate as a proxy. Birth Rate is the growth rate of the SME in the current period, it can indicate the overall development, generation and operation in a certain area and can directly reflect the trend of the number of the SME. Also, the definition of SME has changed several times in China, the influence of these changes must be eliminated when conducting dynamic research. Additionally, there is no precise data related to the number of SME in the current statistical system. Consequently, the empirical results in previous studies may be not robust for lacking precise data.

The province-level Birth Rate of SME in this essay is calculated based on 1998-2013 data in Database of Industrial Enterprises above Scale of China. Two steps are taken when screening the data, the first step is eliminating the industrial enterprises whose main business income is below 20 million Yuan. This is because the entry standard of the database has undergone three adjustments in 30 years: data from 1998-2006 contain all the state-owned enterprises and other enterprises with main business income higher than 5 million Yuan. From 2007-2010, data of all the industrial enterprises with a main business income above 5 million Yuan are included. Then from 2011-2013, all the enterprises with main business income over 20 million Yuan are included. In order to make the growth rate comparable in the same period, it is necessary to eliminate enterprises with main business income lower than 20 million Yuan. Then, given the fact that the definition of SME has changed several times in China, the second step is screening the database based on the 2011 version definition of SME. According to the 2011 definition, enterprises with more than 1000 employees and over 400 million Yuan main business income are defined as large enterprises, other enterprises are defined as SME. But many of the large enterprises in the database has no employee data, using the definition mentioned before will mistakenly count the large enterprises without employee data as SME. So, this essay applies a simple and clear standard: enterprises with more than 400 million main business income are large enterprises and others are SME. By doing so, empirical results will be more robust.

4.3 Main variables and descriptive statistical analysis

This essay used 1998-2013 data in 29 provinces in China. Other two provinces, Xizang and Hainan, are excluded because of data missing. The sample size in those two areas is too small to conduct empirical analysis. As for variables, besides CR4, HHI and SME Birth Rate mentioned above, several other relatively important variables are picked from existing articles.

Table.1: Variable name and definition

Variable name	Definition and explanation (by year and by province)
<i>SMB</i>	<i>SMB</i> represents the market share of SMBs. SMBs are defined as the banks other than the four biggest banks, that is $SMB=1-CR4$. The banking market stated in this essay includes 5 large commercial banks, 12 joint-equity commercial banks and 145 city commercial banks. In each province, CR4 is calculated as the ratio between the loan amount of four banks with the highest loan amount and the total loan amount of the banking market. HHI is the sum of squares of the loan amount of each bank. Higher CR4 and HHI will lead to lower <i>SMB</i> , which indicates a higher degree of market concentration and monopoly.
<i>N</i>	Logarithm of SME number. SME here means the SME in China (defined as having over 40 million Yuan main business income)
<i>Birthrate</i>	$(N_{i,t} - N_{i,t-1}) / N_{i,t-1}$ Birth rate of SME, reflects to the growth rate of quantity of SME. .
<i>Lngp</i>	Logarithm of Gross Output Value of Industrial Enterprises, reflects the regional overall industrial development and has a tight connection with development of SME. One of the major controlled variables.
<i>SOE</i>	The influence of the state-owned economy , SOE =industrial sales output value of state-owned enterprises/ gross industrial sales output value.
<i>Open</i>	The influence of the economic openness. $Open$ = money amount of import and export / GDP
<i>Cyhg</i>	Influence of the industrial structure, $Cyhg$ = tertiary industry output value/ current price GDP.
<i>finance</i>	Influence of financial deepening, $finance$ =loan balance/ current price GDP
<i>Bxsd</i>	Insurance depth, $Bxsd$ =Insurance income/ current price GDP

Table 2 : Main variables and descriptive statistical analysis

	Average	Mean	Max	Min	Std	Skewness	Kurtosis
<i>Birthrate</i>	0.1389	0.1183	1.6324	-0.3493	0.2155	1.4920	9.7478
<i>SMB</i>	0.2258	0.2146	0.5192	0.0102	0.1314	0.2533	1.9871
<i>HHI</i>	0.1861	0.1795	0.3260	0.0787	0.0624	0.3156	2.0160
<i>N</i>	7.7380	7.7209	10.5947	4.0943	1.3134	-0.0689	2.7114
<i>Lngp</i>	8.6137	8.6621	11.6844	4.8073	1.3506	-0.1124	2.6449
<i>SOE</i>	0.4950	0.5172	0.9428	0.1079	0.2118	-0.0400	1.9864
<i>Open</i>	0.3192	0.1235	1.6838	0.0000	0.4097	1.8343	5.2772
<i>Cyhg</i>	0.3996	0.3900	0.7650	0.2860	0.0767	2.5158	11.1605
<i>finance</i>	1.0729	1.0164	2.5847	0.5372	0.3470	1.6181	6.5218
<i>Bxsd</i>	0.0252	0.0238	0.0780	0.0096	0.0095	2.0481	10.2316

Sources: PBOC, National Bureau of Statistics, RESSET, Wind, Statistic Yearbook of Insurance Industry.

4.4 Model specification

According to the hypotheses stated above, the dependent variable is Birthrate, core explanatory variables are *SMB* and quadratic term of *SMB*, other explanatory variables include *N*, *Lngp*, *SOE*, *Cyhg*, *Open*, *Finance*. The model is a two-way fixed effect model which controls the differences of time and region respectively.

$$Birthrate_{it} = \beta_1 SMB_{it} + \beta_2 SMB_{it}^2 + \beta_3 N_{it-1} + \beta_4 Lngp_{it} + \beta_5 SOE_{it} + \beta_6 Cyhg_{it} + \beta_7 open_{it} + \beta_8 finance_{it} + SMB * SOE + SMB * Cyhg + \delta_i + \mu_t + \varepsilon_{it}$$

Table 3: Two-way fixed effect model

<i>Birthrate</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>SMB</i>	0.2418*** (0.0807)	1.5589*** (0.3138)	0.9350** (0.3898)	0.6859* (0.3804)	0.7112* (0.3796)	2.1042*** (0.4801)	1.1935*** (0.4648)	1.9222*** (0.4886)	1.2765*** (0.4036)
<i>SMB*2</i>		-2.7164*** (0.6264)	-2.1052*** (0.6474)	-1.5701** (0.6350)	-1.3634** (0.6439)	-2.055*** (0.6787)	-0.2939 (1.2633)	-2.5729*** (0.7310)	-0.0258 (1.0372)
<i>N(t-1)</i>			-0.1864*** (0.0261)	-0.2598*** (0.0289)	-0.2551*** (0.0289)	-0.7544*** (0.1914)	-0.7656*** (0.1846)	-0.2259*** (0.0296)	-0.7730*** (0.1882)
<i>ln_gp</i>			0.1923*** (0.0318)	0.1981*** (0.0308)	0.1836*** (0.0318)	0.4684*** (0.1425)	0.4287*** (0.1373)	0.1789*** (0.0324)	0.4274*** (0.1357)
<i>Soe</i>				-0.4816*** (0.1700)	-0.4937*** (0.0914)		-0.9206*** (0.2589)		-0.8791*** (0.2641)
<i>Cy_{jg}</i>					-0.2593* (0.1458)	-0.8758* (0.5003)			-0.3031 (0.3608)
<i>open</i>						0.1290 (0.1408)	0.1769 (0.1288)	0.0032 (0.0424)	0.1620 (0.1201)
<i>finance</i>						0.0210 (0.1040)	0.1344 (0.1348)	-0.0513 (0.0551)	0.1255 (0.1347)
<i>SMB*soe</i>						-1.6546*** (0.5161)		-1.1203*** (0.3669)	-0.2926 (0.3983)
<i>SMB*cy_{jg}</i>							-2.8274* (1.3968)	-0.0010 (0.6694)	-2.2001* (1.1545)

Table 3: Two-way fixed effect model (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant term	0.084*** (0.021)	-0.0279*** (0.0331)	-0.1645*** (0.0904)	0.6035*** (0.1700)	0.7827*** (0.1972)	1.9659 (0.5161)	2.5134*** (0.4251)	0.2232 (0.1742)	2.6676*** (0.5139)
Sample size	406	406	406	406	406	406	406	406	406
Province number	29	29	29	29	29	29	29	29	29
Adjusted R2	0.019	0.065	0.165	0.2169	0.2211	0.4350	0.4708	0.4571	0.4689
Year fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes
Region fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: standard deviation is bracketed below each coefficient, ***, **, * indicate coefficient is significant under 1%、5%、10% level

Table 3 records the empirical test results of two-way fixed effect. All the models are winsorized in 1% level and robust covariance matrices are used to make sure the result is robust. Row(1) is the result of simple regression using *SMB* as the only explanatory variable. The coefficient of *SMB* (0.248) is significant in 1% level, indicating the rising market share of *SMB* will benefit the generation of *SME*. Row (2) is the regression result with the quadratic term of *SMB* added. The coefficient of *SMB* is positive while that of *SMB*² is negative. Both coefficients are significant in 1% level. The function is a parabola pointing downwards, verified the inverted U shaped relationship between Banking market structure and *SME* generation. In row(3), two control variables, $N_{i,t-1}$ and Ln_{gp} , are added to control the impacts of the base number of *SME* and economic base of the local area. To avoid multicollinearity, no more control variables are added. Those two control variables show relatively strong explanatory power. The coefficient of *SMB* and *SMB*² both changed. The former falls from 1.56 to 0.94 While the latter changes from -2.72 to -2.11. Still, both of them are significant under 1% level. $N_{(t-1)}$ has a significantly negative coefficient. The economic explanation for this result is that the growth rate of enterprise number is negatively related to the enterprise number of last period. According to the base effect, if the enterprise number has already reached a relatively high level, it is difficult to keep a high growth rate. In the meantime, the coefficient of Ln_{gp} is significantly positive as expected. Because Ln_{gp} represents the economic base and scale, the higher the Ln_{gp} , the better the economy in a certain area. And it is rational to expect a higher Birthrate of *SME* in the region with a better economic environment. Row (4)-(9) contain different combinations of control variables, except for few insignificant coefficients of quadratic term, all other *SMB* coefficients are significant. This result strongly supports the theoretical hypothesis made before: there is an inverted U shaped relationship between banking market structure and *SME* generation. (over significant results may indicate the endogenous problem)

With fewer control variables, Model (2)-(5) have coefficients varies within an acceptable range. Those models can be used to find the inflection point of the quadratic function. With a negative quadratic term, this function increasing on the left side of inflection point and decreasing on right. By calculating the arithmetic mean of the coefficients in the model(2)-(5), the inflection point can be approximated at 0.2471, namely, when CR4 of banking market equals to 24.71%, the market is optimal and best suit for the development of the *SME*. By the end of 2017, the biggest four banks in China(ICBC, BOC, CCB and ABC) collectively contributed 38.2% of the loan balance. (type IV oligopoly according to Bain

Classification). According to the fact that a CR4 below 30% is generally thought to indicate a competitive market, there is still some room for improvement in China's banking market. Actually, a 10%-15% decrease of CR4 may lead a market close to optimal. So, improving the market share of SMB by further deregulation is a practical way to support SME.

Model (4), (5),(6) add some control variables that can mirror the regional economic characteristics to reflect the regional economic differences which could influence the generation of SME. In all three models, the coefficient of *SOE* is significantly negative, indicating that a higher state-owned share in the regional economy may cause negative impacts on SME generation. Model (8) further contains *SMB*SOE* variable, which is still significantly negative. One logical explanation is that in the region where the state-owned economy has a great influence, the government often deeply joins the market. The great market power of state-owned enterprises then will crowd out the private economy. Model (7) introduces another interaction term *SMB*Cyjg* and still, the coefficient of it is significantly negative. The reason is that the scope of statistics only incorporated industrial enterprises above a certain scale but not those SMEs in tertiary industry. So a higher portion of the tertiary industry means a lower portion of the secondary industry, in other words, a worse regional industrial economic base which could lower the Birthrate of SME.

4.5 Instrumental Variable method

Considering the possibility that the development of SME might in turn influence the banking market structure, the potential endogenous problem behind this possibility must be solved. According to a method put by Hasan et al. (2015), this essay uses province level insurance depth as the instrumental variable of banking market structure. On one hand, the regional insurance depth is highly related to the banking market structure. To be more specific, insurance depth generally has a positive relationship with regional financial development. And a highly developed financial market will bring a more decentralized and more competitive banking market. On the other hand, in terms of exogeneity, premium income can hardly affect the productivity of SMEs directly, so the insurance industry actually has few influences on SME. In conclusion, insurance depth is a suitable instrumental variable for the model. Using two-stage least square method to conduct the empirical test (other explanatory variables are 1 time-lagged to alleviate the influence of endogenous problem), the result indicates the coefficients of *SMB* and *SMB*² are significant. Same results can be found in (3)-(9) in which a series of control variables are added.

Table4:Instrumental Variable method

<i>Birthrate</i>	IV(1)	IV(2)	IV(3)	IV(4)	IV(5)	IV(6)	IV(7)	IV(8)	IV(9)
<i>SMB</i>	1.0212*** (0.1236)	8.1777*** (1.6160)	5.6747*** (1.5221)	5.5790*** (1.6035)	4.3164** (1.7425)	2.8067** (1.4500)	5.8714** (3.0175)	4.7288** (2.6776)	1.9218* (1.4491)
<i>SMB*2</i>		-5.1726*** (1.6899)	-3.7108*** (1.3851)	-3.8447*** (1.4614)	-7.0278*** (1.6751)	-3.0141 (5.1041)	-3.7051 (3.5716)	-3.7973* (2.2740)	-5.8545** (2.5237)
<i>N(t-1)</i>		-0.1980 (0.1466)	-0.3955*** (0.0959)	-0.3661*** (0.1048)	-0.4282*** (0.1421)	-0.1767** (0.1014)	0.1849 (0.1775)	-0.0789 (0.0788)	-0.2338*** (0.0328)
<i>ln_{gp}</i>		-0.4530** (0.2153)	-0.2508 (0.1693)	-0.2709 (0.1821)	0.0552 (0.2510)	-0.1880 (0.1203)	-0.4741* (0.2597)	-0.1431 (0.1951)	0.1362*** (0.0437)
<i>Soe</i>			-1.2066*** (0.2533)	-1.3662*** (0.2736)	-1.3300*** (0.3101)	-0.3832 (0.5493)			-0.2671 (0.2493)
<i>Cy_{jg}</i>				1.2583 (0.8294)	0.3459 (0.7058)		0.3720 (1.1095)		-1.3596 (1.0049)
<i>open</i>					-0.1675 (0.1624)				-0.0429 (0.0501)
<i>finance</i>					0.7002*** (0.1375)				-0.0229 (0.0625)
<i>SMB*soe</i>						-1.0903* (0.7841)		-1.2014* (0.7931)	-1.0917 (1.0980)
<i>SMB*cy_{jg}</i>							-6.3705 (7.3328)	-3.2643 (5.6059)	4.5079* (3.2024)
Constant term	-0.0918*** (0.0279)	4.0676*** (0.6483)	4.8905*** (4.8905)	1.2838 (1.3262)	2.2599*** (1.2819)	3.1522** (1.4902)	2.1949*** (0.8966)	1.5852* (1.1313)	1.1143*** (0.4445)

Table4:Instrumental Variable method (continued)

	IV(1)	IV(2)	IV(3)	IV(4)	IV(5)	IV(6)	IV(7)	IV(8)	IV(9)
Sample size	377	377	377	377	377	377	377	377	377
Province number	29	29	29	29	29	29	29	29	29
Adjusted R2	0.0271	0.0532	0.1740	0.7064	0.0817	0.6587	0.5090	0.5911	0.1155
Year fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes
Region fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: standard deviation is bracketed below each coefficient, ***, **, * indicate coefficient is significant under 1%、5%、10% level

4.6 Robustness test

The empirical model in this essay verifies the hypotheses made before. To improve the robustness of the result, two more tests are conducted. First, using *HHI* as a substitute variable of *SMB*, namely replace *SMB* with *HHI*. *HHI* is a contrary indicator of banking market competition ranged from 0 to 1, the smaller the *HHI*, the greater the competition. As shown in table 3, in tests (1)-(9), the coefficient of *HHI* is significantly negative while that of HHI^2 is significantly positive, this is consistent with the theoretical hypothesis and the inverted U shaped relationship between banking market structure and SME generation.

Table 5: Robustness test

<i>Birthrate</i>	IV(1)	IV(2)	IV(3)	IV(4)	IV(5)	IV(7)	IV(8)	IV(9)
<i>HHI</i>	-0.8385*** (0.3311)	-1.0225*** (0.3656)	-0.7839*** (0.2824)	-0.7839** (0.3797)	-0.9731* (0.5441)	-2.4525*** (1.1976)	-2.8743*** (1.0858)	-2.1653*** (0.7067)
<i>HHI*2</i>						3.2650** (2.6659)	3.0276* (1.9371)	2.9346* (2.0188)
<i>N(t-1)</i>		-0.2642*** (0.0379)	-0.3227*** (0.1121)	-0.3227*** (0.0393)	-0.3098*** (0.1130)	-0.1986*** (0.0272)	-0.3919*** (0.1495)	-0.3095*** (0.1058)
<i>ln_gp</i>		0.2128*** (0.0452)	0.1157** (0.0568)	0.1157** (0.0492)	0.1000* (0.0605)	0.1617*** (0.0310)	0.1429* (0.0793)	0.0926* (0.0582)
<i>Soe</i>			-0.6075*** (0.1658)	-0.6075*** (0.1145)	-0.5720*** (0.1894)		-0.6569*** (0.2129)	-0.6256*** (0.1798)
<i>Cy_{jg}</i>			-0.3078 (0.2037)	-0.3078 (0.2363)	-0.0541 (0.2086)	-0.1340 (0.2340)		0.0274 (0.2067)
<i>openess</i>				-0.1175** (0.0610)	-0.0876 (0.0695)	0.0118 (0.0394)	-0.0968 (0.0655)	-0.0921 (0.0661)
<i>finance</i>				0.0672 (0.0464)	0.1022** (0.0445)	0.0182 (0.0502)	0.1287 (0.0659)	0.0978** (0.0415)
<i>SMB*soe</i>					0.3125 (0.3414)	-0.8651*** (0.2611)		0.4765 (0.3716)
<i>SMB*cy_{jg}</i>					-0.8397* (0.4846)		-1.6263** (0.7180)	-1.3057*** (0.4945)
Constant term	0.2949*** (0.0616)	0.5086* (0.3103)	0.8546*** (0.3524)	2.1358*** (0.4454)	2.0156*** (0.6573)	0.2583 (0.2925)	2.3698*** (0.7758)	2.2144*** (0.5947)

Table 5: Robustness test(continued)

	IV(1)	IV(2)	IV(3)	IV(4)	IV(5)	IV(7)	IV(8)	IV(9)
Sample size	406	406	406	406	406	406	406	406
Province number	29	29	29	29	29	29	29	29
Adjusted R2	0.6824	0.7520	0.7651	0.7783	0.7731	0.7524	0.7467	0.7786
Province fixed effect	yes	yes	yes	yes	yes	yes	yes	yes
Year fixed effect	yes	yes	yes	yes	yes	yes	yes	yes

Note: standard deviation is bracketed below each coefficient, ***, **, * indicate coefficient is significant under 1%、5%、10% level

Second, considering the potential endogenous problems may exist in control variables and the dynamic nature of economic development, this essay introduces lagged term of the explained variable to build a dynamic panel data model. According to Arellano and Bond (1991), Arellano and Bover (1995), DIF-GMM method is used to take robustness test. The steps of DIF-GMM include obtaining the first order difference of the model to eliminate the fixed effect existed in variables. Then explained variable and lagged predetermined variables are used as the instrumental variable to take GMM regression analysis. It is worth noting that Arellano—Bond hypothesizes instrumental variables are effective and residual term of difference equation is not second-order autocorrelated. The former hypothesis is tested by Sargan test, the null hypothesis in this test is that the overconstrained model is valid. The latter hypothesis is tested by autocorrelation test, the null hypothesis of the test is that there is no second order autocorrelation, To sum up, if both null hypotheses cannot be rejected ($P > 0$), then the difference model is acceptable. Based on the empirical results showed in table 4, the P values of Sargan test and AR(2) test are both greater than 0.1, indicating the model passed the tests. As for variable coefficients, the coefficients of D, SMB and D.SMB² are significantly positive and negative respectively. This, again, verified the inverted U shaped relationship between banking market stricture and SME generation. Additionally, the signs of other variables are mostly consistent with the previous estimation.

Table 6: DIF-GMM test

<i>D.Birthrate</i>	(1)	(2)	(3)	(4)	(5)
<i>D.Birthrate (-1)</i>	0.0532*** (0.009)	0.1234*** (0.0142)	0.0443*** (0.0143)	0.1087*** (0.0324)	0.0677** (0.0338)
<i>D.SMB</i>	0.8667*** (1.7463)	1.9731*** (0.6552)	3.1072*** (1.0207)	5.3602*** (1.4144)	2.7552** (1.1771)
<i>D.SMB*2</i>		-11.0343*** (2.1601)	-8.0834*** (2.2400)	-3.8103** (1.7303)	-4.2204*** (0.8402)
<i>D.N (-1)</i>	-1.4137*** (0.0185)	-1.9667*** (0.0796)	-1.9735*** (0.0713)	-1.8278*** (0.0582)	-1.7815*** (0.0650)
<i>D.LNGP</i>	0.9149*** (0.0164)	1.7630*** (0.0909)	1.9501*** (0.0825)	1.0650*** (0.0893)	0.9869*** (0.0777)
<i>D.SOE</i>			-4.1946 (0.6775)		-1.6399*** (0.2955)
<i>D.OPEN</i>				0.2921*	0.3627**

				(0.2921)	(0.1820)
<i>D.FINANCE</i>				-0.3749*** (0.0957)	-0.1829* (0.0980)
<i>D.CYJG</i>				-1.1460*** (0.4385)	
<i>D.SMB*SOE</i>				-5.0028*** (1.2382)	

Table 6 DIF-GMM test (continued)

	(1)	(2)	(3)	(4)	(5)
<i>D.SMB*CYJG</i>					-9.1730*** (2.7347)
Sample size	348	319	319	319	319
Province number	29	29	29	29	29
Sargan test	0.2751	0.1299	0.3634	0.2170	0.1840
AR (2) test	0.6035	0.3543	0.2354	0.3844	0.9204

Note: standard deviation is bracketed below each coefficient, ***, **, * indicate coefficient is significant under 1%、5%、10% level, D refers difference, Sargan and AR(2) test results are given as P value.

5 Conclusion and Suggestion

The relationship between finance and the real economy has long been a crucial research area. From the perspective of the banking market structure, this essay tries to find the micromechanism behind that relationship. Currently, the financing problems of SMEs are wildly concerned and many financial institutions have introduced relevant policies to deal with those problems. considering the background mentioned above, the practical meaning of the essay is even significant. The empirical study in this essay reveals the fact that the birth rate of SME is positively related with SMBs' market share and negatively related to the quadratic term of SMBs' market share, verified the inverted U shaped relationship between SME birth rate and SMB market share.

It is not rational to expect to solve the financing problem of SME in short-term and temporary incentive policy is not the panacea. For the sake of long-term development, a long-term developing mechanism must be established along with various supporting measures. The theoretical hypotheses and empirical results in this essay have offered some relatively clear policy suggestion:

Firstly, for the government, the institutional improvement should be completed as soon as possible. The financing obstacles met by SMEs should be emphasized and solved. Also, the government should improve the information disclosure of SMEs by integrating various data sources such as industrial and commercial department, tax department and customhouse. By doing so, banks will be able to transfer the soft information of SME into standardized hard information to provide more credit support. In addition, the empirical result in this essay suggests that the portion of the state-owned economy and the structure of industry could effectively impact the SME. In order to support the development of the private economy, it is necessary to prevent the crowd effect of the state-owned economy. At the meantime, the industry structure should be upgraded and transformed to guarantee the sustainable growth of the economy.

Secondly, for the supervisors, there are three suggestions may be found useful. First, it is important to make a good top-level design for the development of the banking industry and further complete the structure of the banking market. The banking market should be kept in a situation between monopoly and perfect competition. In China, it requires a moderate increase of SMB market share. Second, SMBs should be guided to focus on their main business, serving the SME, to grow in the field where they have advantages over their larger peers. In order to do so, efforts should be taken to enhance the competitiveness of SMB. For example, regulators could provide relevant preferential policies and government could offer some preferential resources such as fiscal deposit and key project investment. Lastly, enough attention should be paid to the operational risks of SMBs. More prudent and rigorous supervisory policies should be applied to prevent the risks, especially those may incurred by the cross-regional operation. Also, reforms are required in terms of company governance and internal control for SME to prevent the internal moral hazard.

Last but not least, banks should actively promote operation transformation and strategic adjustment. Also, they should realize the importance of serving SME in strategic level, strengthen the internal assessment and incentive system and enhance the ability to recognize and manage the risk. Large banks should play the role of the stabilizer in the banking market while SMBs should apply differential competitive strategy and form a characteristic business. By utilizing their comparative advantages, large banks and SMBs will be able to better serve the real economy together.

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