



China Banking Market Structure and Performance: Based on Panel Data 2000-2010

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Abstract

This paper is devoted to analyzing the relationship between China banking market structure and performance. We employ the methodology of SCP (structure-conduct-performance), introduce macro economics factors into regression model and use the panel data of 14 major commercial banks in China Mainland from 2000 to 2010. The results show that China banking market is still in the oligopoly status, and the oligopoly degree reduces gradually over time. The oligopoly degree has a negative correlation with the performance. The deposit-loan ratio and the capital adequacy ratio have both positive correlations with the performance. We propose four advises for reducing the oligopoly degree and improving banking industry. They are (1) Reducing great banks network externalities barriers; (2) Drawing private capital invests into the banking industry; (3) Slackening restrictions to foreign banks; (4) Developing the market of small-micro enterprises loan.

Key words: Market structure; Banking performance; Oligopoly; China

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INTRODUCTION

The banking industry, as a very important role of the financial system, influences a country's economy profoundly. The research showed that increases in the market share of small banking institutions enhance economic growth in contemporary China (LIN & SUN, 2008). In the past years, China banking market has experienced a series of great reformations that shareholding commercial banks, small-medium banks, local commercial banks and credit cooperation had been emerging and developing continuously, the statuses of big four banks oligopolies¹ are shocked by increasing competition. Nowadays, there are more than 200 native banking institutions all over China and more than 180 foreign banking branches or offices. However, oligopoly status still exists and will persist for long term. This article focus on what effects oligopoly market structure has on banking performance and what should be done.

Most of scholars' studies on banking market structure and performance focus on two areas. One is SCP theory and another is Efficiency Hypothesis (EH). The study supports the EH hypothesis as an explanation for market performances in Bangladesh (Abdus Samad, 2008). HE (2005) said that the market power hypothesis and the efficient structure hypothesis which are used to explain the banking performance in foreign countries are of no effect in Shanghai banking industry. YUAN (2006) indicated that the banking system in China was already near a state of perfect competition before foreign banks began to enter China's financial market. On the perspective of sharing holding, scholars pointed that a higher ownership concentration is associated with better loan quality, lower asset risk and lower insolvency risk (Giuliano Iannotta, Giacomo Nocera & Andrea Sironi, 2007). Under the frame of SCP paradigm, TU and CHEN (2006) indicated that the ownership structure and market structure both

¹They are Industrial and Commercial Bank of China (ICBC), Agricultural Bank of China (ABC), Bank of China (BOC) and China Construction Bank (CCB).

have significant effect on state-owned commercial banks performance, however, to joint-stock commercial banks, the market structure effect more on performance. An increase in the degree of market power leads to greater bank stability and enhanced profit efficiency (Rima Turk Ariss, 2010). XU, SHEN, WANG, and SHEN (2009) showed that China's market structure supports the hypothesis of relative market strength.

The SCP paradigm, as a classical method, is always used to study various industries by scholars. Therefore, in this article, we also employ SCP to analyze the banking industry by using latest data. Especially, the macroeconomics factors are included in the regression model.

The remainder of the paper is organized as follows. Section 1 introduces data source and applied variables. Section 2 shows the empirical analysis process. In section 3, we give conclusions and propose recommendations for reducing the oligopoly degree and improving banking industry.

1. DATA AND VARIABLES

1.1 Data Source

To examine the relationship between banking market structure and performance, an econometric regression model should be established, and then introduce the index of market structure into the regression model. Certainly, a number of other factors affect the performance even the whole regression model will be expounded in the following part. Reasonable data are of great importance to the regression model. The sampled data are from 14 major commercial banks in China mainland. They are big four state-owned commercial banks and other ten joint-stock commercial banks. The big four state-owned commercial banks are Industrial and Commercial Bank of China (ICBC), Agricultural Bank of China (ABC), Bank of China (BOC) and China Construction Bank (CCB). The other joint-stock commercial banks are Bank of Communication (BCM), China CITIC Bank (CITIC), China Everbright Bank (CEB), Huaxia Bank (HXB), China Minsheng Bank (CMBC), Shenzhen Development Bank (SDB), China Merchants Bank (CMB), Industrial Bank (CIB), Shanghai Pudong Development Bank (SPDB), and China Guangfa Bank (GDB).

The samples selected for the time spans from 2000 to 2010. For this research, authors gathered banking data from Almanac of China's Finance and Banking and banks' annual reports. Macroeconomics data are from China Statistical Yearbook.

The reasons why the 14 banks selected are they hold the most share of China banking market, their branches are nearly across China and hold majority of customers. Other small-medium and foreign banking institutions are not be taken as the result of little business, micro market share, weak influences and regional limitation. What should be also declared is all of the data are focus

on RMB business, foreign currency transactions are not considered in this paper.

1.2 Variables

The variable in this paper used to represent market structure is Herfindahl-Hirschman Index (*HHI*). Moreover, *CR_n*, the market concentration rate, is usually utilized to represent market structure. But, *CR_n*, an absolute index which only represents the top *N* enterprises scale, can't reflect all enterprises situation of some industry. Therefore, we adopt *HHI* which reflects the enterprises number and relative scale synthetically. It is sensitive to the variation of top-ranking enterprises' scale. The equation of *HHI* is showed as equation (1).

$$HHI = \sum_{i=1}^N (X_i / X)^2 \quad (1)$$

For this equation, *N* represents the total number of enterprises, *X_i* represents the scale of enterprise *i* and *X* represents the total scale of markets, so *X_i/X* represents the market share of enterprise *i*. In general, the *HHI* is always multiplied by 10000, but in the regression model we don't. Table 1 shows the classification of market structure type by using *HHI*.

Table 1
Classification of Market Structure by Using *HHI*

Type	Range of <i>HHI</i>
Oligopoly type <i>HHI</i> ≥ 1000	High oligopoly I <i>HHI</i> ≥ 3000
	High oligopoly II 3000 > <i>HHI</i> ≥ 1800
	Low oligopoly I 1800 > <i>HHI</i> ≥ 1400
	Low oligopoly II 1400 > <i>HHI</i> ≥ 1000
Competition type <i>HHI</i> < 1000	Competition I 1000 > <i>HHI</i> ≥ 500
	Competition II 500 > <i>HHI</i>

In regression model, there are two kinds of variables. One is explained variable and another is explanatory variable. Regression model and variables used in this paper are based on methods adopted by existing literatures (TU & CHEN, 2006, Abdus Samad, 2008). Certainly, there are a few changes in this research. The regression model is proposed in section 2. Variables and their explanations in this article are listed in Table 2. We use Return on Stockholders' Equity (*ROE*) to represent banking industrial performance. It is regarded as explained variable in the regression model. Moreover, the explanatory variables include structure variables and controlling variables. Besides the variable of market structure *HHI*, as known that the performance of an enterprise is related to its scale, so Market Share (*MS*) is employed as another structure variable in the regression model to represent banks' market power. We also employ a number of other controlling variables. They are deposit-loan ratio (*RATE*), capital adequacy ratio (*CAR*), per

capita GDP growth (*PCG*) and portion of tertiary industry output in GDP (*INS*).

Deposit-loan ratio (*RATE*) and Capital adequacy ratio (*CAR*) are used as explanatory variables, because the banking performance is relevant to the managing ability, *RATE* reflects the profit ability and *CAR* reflects the ability of resisting risk. Both of them reflect the bank managing ability. Banking industry is an intermediary for regulating macro economy, macro economy development drives all social industries performance and banking

performance is certain influenced by its operation profoundly. It is necessary to consider macroeconomics variables introducing into the regression model. So, the per capita GDP growth (*PCG*) is employed in the model. Economic policy always influences an industry development. Banking sectors, as the key component in tertiary industry, are easily impacted by industry policy. So, we use the portion of tertiary industry output in GDP (*INS*) as a variable to reflect the impact of industry policy and structure transferring in the regression model.

Table 2
Explanations of Variables in This Paper

Performance Variable	ROE (Return on Stockholders' Equity)	$\frac{Net\ Profit}{Capital}$
Structure Variables	HHI (Herfindahl-Hirschman Index)	$\sum_{i=1}^N (Xi / X)^2$
	MS (Market Share)	$\frac{Xi}{\sum_{i=1}^n Xi}$
	$RATE$ (Deposit-Loan Ratio)	$\frac{Balance\ of\ Deposits}{Balance\ of\ Loans}$
Controlling Variables	CAR (Capital Adequacy Ratio)	$\frac{Ownership\ Interest}{Assets}$
	PCG (Per Capita GDP Growth)	$\frac{PCG_t - PCG_{t-1}}{PCG_{t-1}}$
	INS (Portion of Tertiary Industry Output in GDP)	$\frac{Tertiary\ Industry\ Growth}{Total\ GDP}$

2. EMPIRICAL AND REGRESSION ANALYSIS

2.1 Empirical Analysis on Banking Market Structure

We worked out the *HHI* of China banking market structure by using equation (1) and the results are presented in Table 3.

Table 3
HHI of China Banking Market Structure: 2000-2010

HHI	Total of Assets	Balance of Deposits	Balance of Loans
2000	0.1979	0.2238	0.2267
2001	0.1863	0.2038	0.2147
2002	0.1794	0.1878	0.1910
2003	0.1975	0.2103	0.1782
2004	0.1614	0.1671	0.1683
2005	0.1616	0.1656	0.1555
2006	0.1587	0.1493	0.1496
2007	0.1513	0.1562	0.1422
2008	0.1451	0.1559	0.1386
2009	0.1428	0.1489	0.1364
2010	0.1376	0.1436	0.1337

Statement: The results are figured out based on Almanac of China's Finance and Banking and Banks' Annual Reports.

Comparing and analyzing Table 1 and Table 3, then list the analysis results in Table 4. According to Table 1 and Table 3, we get that China banking market structure is oligopoly type, and China's banking market sustained oligopoly situation for the past long time. In Table 3, the statistic data tell us that the decline presents a gentle trend. In Table 4, it could be observed that total of assets declines 30.47%, balance of deposits declines 35.84%, especially, the balance of loans decline 41.02%. So, it can be concluded that the oligopoly degree of the market appeared a marked decline during the period of eleven years. Above all, we come three conclusions that China banking market is oligopoly structure, the oligopoly degree is declining and the declining trend is gentle.

Table 4
Data Analysis Results of HHI

HHI	Max (Time)	Min (Time)	Average	Decline
Total of Assets	0.1979 (2000)	0.1376 (2010)	0.1654	30.47%
Balance of Deposits	0.2238 (2000)	0.1436 (2010)	0.1738	35.84%
Balance of Loans	0.2267 (2000)	0.1337 (2010)	0.1668	41.02%

Based on the above analysis data, we explore and summarize the causes. The oligopoly is original from early planned economy period. Before 1980s, China banking market was single-bank status. People's Bank of China played the role of not only central bank but also commercial bank. The big four banks separated successively first, joint-stock commercial banks came soon afterwards. Because of late emerging of joint-stock commercial banks and the public dependence to the big four banks which are supported by national credit, the barriers of network externality blocked the small-medium banks' entrance and development. So the banking market

structure was oligopoly in the past long term. However, as a result of a series of national financial reformations, local governments' supporting to small-medium banks and the open for foreign banking sectors entrance, the oligopoly degree, especially the degree of balance of loans is declining obviously. The reason why the decline trend is gentle is that no matter financial reformations or small-medium banks rising or foreign banking sectors entrance, all of the above are implemented stepwise. It also indicates that there is no severe shocking during banking market developing.

Table 5
14 Banks' Market Share

Bank	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ICBC	0.2997	0.2868	0.2832	0.3156	0.2295	0.2472	0.2445	0.2375	0.2326	0.2232	0.2170
ABC	0.1648	0.1755	0.1780	0.2104	0.1827	0.1799	0.1746	0.1655	0.1672	0.1682	0.1667
BOC	0.2025	0.1802	0.1707	0.0189	0.1944	0.1789	0.1736	0.1640	0.1448	0.1472	0.1469
CCB	0.1910	0.1919	0.1844	0.2141	0.1780	0.1729	0.1774	0.1804	0.1801	0.1823	0.1743
CR ₄	0.8580	0.8344	0.8163	0.7590	0.7846	0.7789	0.7701	0.7474	0.7247	0.7209	0.7049
BCM	0.0474	0.0464	0.0459	0.0572	0.0518	0.0537	0.0559	0.0575	0.0637	0.0614	0.0636
CITIC	0.0177	0.0208	0.0200	0.0253	0.0230	0.0231	0.0230	0.0277	0.0315	0.0336	0.0336
CEB	0.0154	0.0184	0.0191	0.0238	0.0190	0.0194	0.0194	0.0202	0.0203	0.0227	0.0239
HXB	0.0072	0.0095	0.0107	0.0149	0.0139	0.0134	0.0145	0.0162	0.0174	0.0160	0.0168
CMBC	0.0053	0.0096	0.0146	0.0217	0.0203	0.0210	0.0236	0.0252	0.0250	0.0266	0.0287
SDB	0.0050	0.0083	0.0099	0.0116	0.0093	0.0086	0.0085	0.0096	0.0113	0.0111	0.0117
CMB	0.0166	0.0185	0.0222	0.0303	0.0267	0.0277	0.0304	0.0358	0.0375	0.0392	0.0387
CIB	0.0065	0.0087	0.0114	0.0157	0.0155	0.0179	0.0201	0.0233	0.0243	0.0252	0.0297
SPDB	0.0098	0.0121	0.0167	0.0223	0.0207	0.0216	0.0224	0.0251	0.0312	0.0307	0.0353
GDB	0.0112	0.0133	0.0131	0.0182	0.0154	0.0146	0.0122	0.0120	0.0130	0.0126	0.0131
Max	0.2997	0.2868	0.2832	0.3156	0.2295	0.2472	0.2445	0.2375	0.2326	0.2232	0.2170
Min	0.0050	0.0083	0.0099	0.0116	0.0093	0.0086	0.0085	0.0096	0.0113	0.0111	0.0117
Max of All: 0.3156						Min of All: 0.0050					

Statement: We figured out their market shares according to the total assets results based on data from Almanac of China's Finance and Banking and Banks' Annual Reports.)

Table 5 shows the sampled 14 commercial banks' respective market shares annually. Moreover, the big four banks' total market shares are listed in the line of CR₄. The value of CR₄ steady declines annually. This demonstrates the conclusions which obtained when analyzing HHI. It can be observed that the max of all is 0.3156, the min of all is 0.0050. Except for the big four banks, by contrast, each of the other ten just holds a bitsy portion of the whole market. The big four banks' significant outstanding values mean they take the most share of China banking market. Observing all banks' market shares listed in Table 5, especially the values of Max and Min, there is a sharp difference between big four and other ten about market share, which tells us that the banking market is an unreasonable situation. Though many implemented measures in the past, but the big four still hold above 70% of the whole market. A more perfect and efficient competitive environment is urgently needed for China banking industry. This indicates more effective and stronger measures for banking industry reformation.

2.2 Regression Analysis on Market Structure and Performance

According to SCP analyzing paradigm, the market structure affects performance. So we analyze this relationship in this section. A panel data regression model using the identified variables in section 1 is presented as equation (2).

$$ROE_{it} = \beta_0 + \beta_1 HHI_{it} + \beta_2 MS_{it} + \beta_3 X_{it} + \mu_{it} \quad (2)$$

For equation (2), β_0 is constant, μ_{it} is random error, i represents individuality and t represents year. Return on Stockholders' Equity (ROE) is explained variable. Because HHI can reflect the comprehensive condition of the whole banking industry and MS is used to reflect bank individual's market power, HHI and MS are regarded as the index of market structure. The X which stands for other controlling variables includes RATE, CAR, PCG and INS. We introduced the above variables into the regression model and processed the regression analysis by using Eviews6.0. The Hausman-test indicated random-

effect model should be utilized. Because balance of loan can reflects a bank's marketing and managing ability

better than other index, balance of loan *HHI* is used in the regression model. The regression results are listed in Table 6.

Table 6
Results of Regression

Variables	Structure Variables			Controlling Variables		
	<i>HHI</i>	<i>MS</i>	<i>RATE</i>	<i>CAR</i>	<i>PCG</i>	<i>INS</i>
Coefficient Estimations	-0.081589	-0.003167	0.003919	0.013898	0.006253	0.052273
T-Values	-5.019877	-0.674096	3.765672	3.721424	1.200093	2.220252
Significance (1%)	yes		yes	yes		
	F-statistic: 39.52215		R ² : 0.617320		Adj-R ² : 0.601700	

We concern the relationship between performance and variables, especially the *HHI*. In Table 6, the negative sign symbol of *HHI* indicates that the oligopoly degree is negative correlation to banking performance. The capital adequacy ratio, which reflects the ability of resisting risk, the sign symbol of *CAR* is positive and the regression result is significant, so the *CAR* is positive correlation to bank performance.

The regression results show coefficient estimations of *MS*, *PCG* and *INS* are no significant. So, we get that the three variables above have no significant effect on the banking performance in this paper. However, because the sign symbol of *MS* is negative, it can be inferred that the market share expansion leads to the performance lowering. Similarly, the sign symbols of *PCG* & *INS* are positive, so we deem that the healthy macro economy arouse good banking performance. Therefore, it can be concluded that banking performance is positive correlation to macro economic variables (*PCG* & *INS*).

RATE's coefficient is positive and the result is significant. In this article, *RATE* is deposit-loan ratio. Banks pay interest when absorbing deposits and charging when loaning, generally, the deposit-loan ratio lower, the interest income higher. But in this paper, the results show the deposit-loan ratio is positive correlation to performance. It seems dissimilar with common sense. But what should be pointed is that although the regression result of *RATE* is significant, but it is just 0.003919. It shows that the *RATE*'s effecting is rather low compared with the other variables. Additionally, because of fierce competition, banks scrambling for deposits to meet the regulator's requirement of a minimum loan-to-deposit ratio, and impacts from the international financial crisis, enterprises weren't willing to loan. So we believe the results the regression result of *RATE* emerged are robust.

CONCLUSIONS AND RECOMMENDATIONS

(1) Conclusions

According to the empirical analysis based on statistics data, we come three conclusions that China banking

market is oligopoly structure, the oligopoly degree is declining and the declining trend is gentle.

According to the regression results, we conclude that high degree oligopoly leads to low performance, the oligopoly degree has a negative correlation with the performance, and the deposit-loan ratio and the capital adequacy ratio have both positive correlations with the performance. Market share, per capita GDP growth and portion of tertiary industry growth in GDP have no significant influence on banking performance.

Therefore, we deem that it is helpful for improving banking market structure and performance that promoting the breaking oligopoly and managing ability reformation.

(2) Recommendations

At present, the big four banks are still holding the most share of market. The oligopoly status has been longstanding and will last for long term, but emerging of various financial institutions is shocking the banking oligarchs. The structure reformation dynamic mainly originates in the rising of small-medium banks. It cannot solve the problem of monopoly radically. Because capital adequacy ratio is positive correlation to performance, an effective method to improving performance is increasing capital adequacy ratio. The approach of increasing capital adequacy ratio is extending capital. At present, due to restrictions, private capital invested into banking industry is not abundant. Banking individual structure reformation is of great importance also. Banking performance would be improved, the custom and investment would be stimulated if banking sectors loan to privates and enterprises actively. Perfect and efficient competitive environment induces healthy industry development. So, we present the following recommendations.

1) Reducing Great Banks Network Externalities Barriers

Big state-owned commercial banks have more coverage, branches and customer groups. The public are unwilling to be customer of small financial institutions. To break the network externalities barriers, transaction platform construction and improvement are necessary. An effective method to realize the sharing and floating of transaction

information is to interconnect various transaction platforms like China Union Pay, Rural Credit Banks Funds Clearing Center and Clearing Center for City Commercial Banks. Another key is reducing cross regions banking business and customer of cross banks transaction fees, even to some small-medium banking institutions, eliminating fees is necessary. Like that, small-medium banking institutions could hold fixed customers and the network externalities barriers could be lessened.

2) Drawing Private Capital Invests into Banking Industry

Private capital should be invested into establish banks and expend the shareholder span of commercial banks. We deem that absorbing private capital is an effective approach for extending capital scale. It's not only helpful for improving capital adequacy ratio but also helpful for reducing monopoly degree. Multi-polarization of banking market implies more logical competition environment. Meanwhile, it could also share the speculation risk.

3) Slackening Restrictions to Foreign Banks

Although foreign banks have entered China for many years, but their scale is still limited. For instance, Citibank has below 100 branches in China by the end of 2011. Considering the shock to domestic banking from foreign banks, many restrictions were implemented in China. Most foreign banking branches concentrate in economic developed east coastal urban, but few inland. Restrictions for foreign banks in China should be slackened along with inland economic developing. It's an effective approach for achieving complete competition and helpful for native banks to learn advanced experience that eliminating differential treatment between domestic and foreign. Old management patterns leads to path dependence, foreign banks can bring new competition mechanism for domestic banking market. New competition mechanism drives banks reform and new competitors' entrance will reduce market concentration ratio.

4) Developing Market of Small-Micro Enterprises Loan

Small-micro enterprises with limited credits always face problem of loan difficult. There exists capacious market space of small-micro enterprises loan. For instance, in Shaanxi Province, the balance of loan to small-micro

enterprises reached 235.678 billion *yuan* by the end of 2011 (GUO, 2012). This indicates large capacity of small-micro enterprises loan market. While loaning to small-micro enterprises is not the focus of great banks. So, small-medium banks ought to develop in this field. Small-micro enterprises are urgent for some innovation finance service like small loan and microfinance products. Products diversification and differences of competition are efficient ways for small-medium banks to share the market. It is beneficial for small-medium banks competing with big banks and breaking oligopoly status.

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