The Market Competition, Law Enforcement, and Banking System's Efficiency in China

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ABSTRACT

In economic literature, the benefit of competition is well recognized, for example, it could reduce monopoly rents and cost inefficiencies, and finally improve the welfare of the economy. In the case of banking system, the market competition in banking sector could improve efficiency of the banking system as a whole, and promote economic growth as a result. However, the effect of competition on banking system's efficiency hinges on some environmental factors, such as the efficiency of law enforcement. In this paper, we measure the level and evolution of bank system's competition between 1996 and 2009. Making use of the micro data of Chinese commercial banks from 1996 to 2009, we choose the RP method to measure the competition level of China's banking system. Then we study the relationship between market competition, law enforcement and Chinese banking system efficiency, which shows that higher market completion could lead to more efficient banking system. This effect is more salient when law enforcement is more efficient.

Keywords: Market Competition; Law Enforcement; Banking System; China

1. INTRODUCTION

In the literature of economic development, the bank system exerts an important role on the economic growth through financial accumulation and fund allocation. While the competition in bank system could reduce the prices of financial services, thus accelerate investment and growth, it also has non-ignorable impacts upon economic development. Besides, a heightened competition should encourage banks to reduce their costs, namely, their cost inefficiencies, which have been shown around 30 to 50% of the banking sectors' cost in European transitional countries (Hasan and Marton 2001). On the other hand, however, Allen and Gale (2004) indicated that excessive banking competition could encourage excessive risk-taking of banks, hamper the stability of financial system and thus could be seen as a deterrent of economic growth. Therefore, the conclusion about the banking competition's effects is by now not clear-cut.

As to transitional countries like China, the issues about banking competition are especially important, for the bank loan constitutes by far the largest source of funds for companies, and the reduction of cost inefficiencies would lower the loan rate and thus promote investment and economic growth.

The theoretical literature about the link between competition and efficiency is rather rare. Hicks (1935) considers monopoly power as big hindrance to enhance the efficiency of management. In his eyes, monopoly power allows managers to grab a share of the monopoly rents through discretionary expenses or a reduction of their effort. So goes a famous sentence from Hicks: "The best of all

monopoly profits is quiet life." However, Hicks had not explained clearly the reason why the managers in monopolistic company would exert less management effort than those in competitive situation. Then Leibenstein (1966) and Demsetz (1973) put forward complementary theories to extend the work of Hicks.

Leibenstein (1966) clarifies the underlying logics between the efficiency and the level of competition of a company using the concept of X-inefficiency. In his theory, the X-inefficiency is the result of imperfection of the organization of the firm, i.e. the information asymmetry between the workers and the owner. Because the production function of the workers is unknown to the owner of the firm, and still some uncontrolled factors could influence the level of production of the workers, the owner of the firm could not figure out if the reduction of production is due to external stochastic factors or the shrinking of the workers. Of course, this kind of information asymmetry might be greatly reduced through thorough and careful supervision of the owner, but the cost of absolute supervision is prohibitively high, and might exceed the potential revenue increase brought about by enhanced effort and production of workers. Then the workers take opportunity of the owner, and shrink, thus make the efficiency of the firm less than it should be, which is called X-inefficiency. However, the competition of production market could reduce X-inefficiency in two ways: first, the workers face the cost of bankruptcy of the firm. The fear of losing their job might force the workers to work hard and thus improve the overall efficiency of the firm. Second, the existence of other familiar firms in the market makes the owner much easier to assess the real production function of the firm and the workers' behavior of shrinking much easier to detect. Following Leibenstein's works, a few studies have proposed a formalization of his ideas (Hart, 1983; Selten, 1986; Scharfstein, 1988). In fact, the X-inefficiency theory from Leibenstein lies within the scope of the "Structure-Conduct-Performance" (SCP) paradigm proposed by Bain (1951). According to this paradigm, the market structure would influence firm behavior in terms of prices and quantities, and therefore firm profits.

Demsets (1973) proposes an alternative assumption, i.e. the "efficiency-structure" hypothesis. He sees the efficiency as a determinant of the level of competition: The most efficient firms usually have lowest cost and greatest advantage in market competition, thus greatest market share. Still greater market share could facilitate the firm to extract the benefit of scale economy and further lower its cost, thus grab the market share to a larger extent. If concentration could be seen as an inverse function of competition, then the efficiency-structure hypothesis implies the negative correlation between the competition and efficiency.

As to banking industry, the story might be a little different from above, which is referred to general production markets. Generally speaking, the banking industry has an imperfection competition market structure, which is derived from the information asymmetry between the bank and the borrower in credit activity. To relieve the moral hazard and adverse selection problem caused by information asymmetry, the bank tends to form a long-term bank-borrower relationship. However, the competition in banking industry could reduce the term of bank-borrower relationship, thus has a negative impact on the efficiency of banks. So the specific characteristics of banking industry would theoretically hint negative relationship between the competition and efficiency.

The effect of competition on banking system's efficiency also hinges on some environmental factors, such as the efficiency of law enforcement. In theory, the effect will be more salient when the law enforcement in the market is more efficient.

By now only a few empirical studies about the relationship between competition and efficiency in banking industry emerge, for example, Berger (1995), Berger and Hannan (1997), Lang (1996). These papers tend to support a positive relationship between cost efficiency and market share, thus confirm the efficiency-structure hypothesis.

In conclusion, the theoretical outcomes about the relationship between the competition and efficiency are conflicting, while the empirical evidence is in large part in favor of negative relationship between them. So it's rather necessary to provide new evidence about competition-efficiency relationship in banking industry.

2 RELATIVE LITERATURE

This paper relates to the literature of relationship between economic development and banking. The research in the relationship between economic growth and bank sector development can be dated back as early as Schumpeter (1934), and Goldsmith (1969). Since then, this subject has been of paramount importance in economic research. A large amount of literature documents thorough empirical analysis toward the relationship of these two variables, most regression outcomes show that banking system plays an important role in promoting the development of regional economy. For instance, based on cross-nation data Rajan & Zingales(1998) concludes that in a nation mainly dependent upon foreign investment, the higher the banking system's efficiency, the faster the development of its firms. King & Levine (1993a), employing historical date of nearly 80 countries, argues that high positive relevance between bank's development and economic growth exists. They inferred that bank's development could facilitate economic growth by increasing the rate of capital accumulation and economy efficiency. Referring to current domestic literature, Tan Ruyong(1999), Wang Guosong(2001) & Rao Huacun(2001) all identified the casual relationship between banking and economic growth through empirical analysis.

In most empirical literature, the banking system's state of development is usually measured by the scale of banking system or the amount of capital intermediated by banks. To be specific, the indicators used to depict the development of banking system include the ratio between liquid liabilities of the banking system and GDP (King & Levine (1993b)), the proportion of bank branches to the regional resident population (Ferri & Mattesini, (1997)), the ratio between domestic credit and GDP (Rajan & Zingales (1998)), etc. However, these measurements have some inherent flaws in capturing the relationship between banking system development and economic growth, that is, they mainly focus on the effect of bank on stimulating capital accumulation. The theory of financial intermediary developed since 1980's shows that another important function of commercial bank is to discriminate optimal borrowers, alleviate the problem of information asymmetry in the financial market, stimulate the optimal allocation of capital and thus promote economic growth (Diamond (1984), Stiglitz & Weiss (1988)). However, current literature seldom investigates such kind of role of banks on the economic growth by taking empirical methodology. Levine (1997) points out that, the only measuring of financial development which seeks to capture banks' allocative aspects goes to the ratio of the loans granted to private business against the total loans. This approach is based on the premise that the private sector is more efficient than the public one. Obviously, the hypothesis itself is prone to be questioned for various kinds of reasons. Besides, we should notice that, for many developing countries, the share of credit granted to the public sector is mainly the outcome of government intervention rather than the discretionary allocative decisions of banks. In this regard, this measurement itself can't effectively reflect the banks' ability to improve the efficiency of credit allocation, if taking account of political factors.

In this paper, we fill this gap by constructing an indicator which captures the allocative efficiency of banking systems based on micro-efficiency of individual banks, and then investigate the relationship between this indicator and some other economic and social variables, such as, market competition and law enforcement.

3 THE METHODOLOGY

3.1 MEASUREMENT OF COMPETITION

In empirical literature, the measurement of banking competition could be divided into two categories: traditional Industrial Organization approach and new empirical Industrial Organization approach. The traditional IO approach assesses banking competition on the basis of SCP model, and the method it proposed is structural tests. In this regard, the competition could be measured by market share of the three biggest banks, or the Herfindahl index. However, the competition level calculated using traditional IO method has obvious shortcomings, i.e. it derives the competition indirectly of some proxies, such as market structure or market shares.

In comparison with traditional IO method, the new IO approach could solve the problems mentioned above. The method of calculating the competition level in new empirical IO approach is non-structural tests. One of the most common used models in new empirical IO approach is Rosse-Panzar model, which is based on the estimation of H-statistics. The H-statistics is obtained when aggregating the elasticity of total revenues to input prices.

The RP model is based on following assumptions: (1) the banks are operating under long-term equilibrium; (2) the banks are similar and have Cobb-Douglas production function; (3) the conducts of banks are interdependent.

The condition for banks' profit maximization is as below:

$$R_i^{'}(x_i, n, z_i) - C_i^{'}(x_i, p_i, t_i) = 0 \tag{1}$$

In equation (1), $R_i^{'}$ is the marginal revenue of bank i, $C_i^{'}$ is the marginal cost of bank i, x_i is the output of bank i. n is the number of banks, and p_i is the price of input of bank i. z_i and t_i are exogenous independent variable, which could have impact on the revenue function and cost function of banks.

At equilibrium, the condition for zero profit is as follows:

$$R_i^*(x^*, n^*, z) - C_i^*(x^*, p, t) = 0 \tag{2}$$

In the equation (2), the variables with star mean value in equilibrium.

Then the competition level H could be calculated as follows:

$$H = \sum_{k=1}^{m} \frac{\partial R_i^*}{\partial p_{ki}} \cdot \frac{p_{ki}}{R_i^*} \tag{3}$$

In empirical studies, the calculation of H involves the model as below:

$$LnRA_{it} = \alpha_0 + \alpha_1 Lnp_{1,it} + \alpha_2 Lnp_{2,it} + \alpha_3 Lnp_{3,it} + \varepsilon_{it} \tag{4}$$

In equation (4), RA stands for the bank's total income divided by its total asset, p_1 is calculated by operation cost divided by total asset; p_2 is interest expenditure divided by total deposits; and p_3 is the depreciation value of fixed asset divided by its net value. Then, H could be calculated as follows:

$$H = \alpha_1 + \alpha_2 + \alpha_3 \tag{5}$$

If $H < 0$, then the market is a monopolistic one; if $H = 1$, the market is competitive; and if $0 < H < 1$, then the market is competitive monopolistic. The bigger the value of H, the higher the level of competition is.

3.2 MEASUREMENT OF EFFICIENCY

3.2.1 THE ESTIMATION OF TECHNICAL EFFICIENCY OF COMMERCIAL BANKS

There exist two kinds of concepts of technical micro-efficiency in current literature: cost efficiency and profit efficiency. In this paper, we choose the concept of cost efficiency to measure technical efficiency of individual bank for the facts that a bank's ability to make profits may not coincide with its ability to screen best borrowers. In some cases, banks can even get admirable profits through the manipulation of prices, which is especially applicable in Chinese banking sector for its less competitive market structure.

The techniques applied when estimating an entity's technical efficiency usually involve DEA technique, also known as non-parametric techniques and stochastic frontier technique, one of the techniques of parametric estimation[1]. We prefer a parametric technique here to make best of its advantage of allowing one to conduct hypothesis test; besides, the estimation of micro-efficiency with this method is unbiased. In what following, we will choose stochastic frontier technique to estimate technical efficiency of individual banks.

Berger (1993) gives the general formula for cost efficiency estimation under parametric techniques:

$$RC = C(Q, W) \cdot U \tag{6}$$

Here, RC represents real cost, $C(Q,W)$ is theoretically minimal cost. $U \in [1, \infty)$ reflects the degree of cost squander of commercial banks, reciprocal of which denotes the value of cost efficiency. $Q = (Q_1, Q_2 \cdots)$ is a vector of quantities for various outputs. And $W = (W_1, W_2, \cdots)$ is a vector for prices of inputs.

Take the logarithm of equation (6), yields:

$$rc = c(Q, W) + \varepsilon + \mu \tag{7}$$

In the equation above, ε is a term of random error; and other variables in lowercase are logarithmic form of the corresponding variables in equation (6).

We should define the inputs and outputs definitely as regard to equation (6) in precedence of conducting regression estimation. In equation (6), price vector takes average cost of loanable funds and average price of operation inputs as its components. As to average cost of loanable funds, it is defined as the ratio between the sum of commission charged and interest expenditure on bank's liability and average quantity of loanable funds, while the average price of operation inputs is taken as the ratio of operation expenses and average total assets. We take the ratio of operating expenses as a proportion of average total assets as the average price of operation inputs. And Bank's outputs are defined as total loans, amount of investment and non-interest proceeds. Finally, for availability of data, we just include three typical items as constituents of total real cost of a bank, which are commission free charged, interest expenditure and operation expenses respectively.

Then we estimate cost efficiency of individual banks with the following formula (Jondrow et al (1982)):

$$\hat{u}_i = E(u_i | \hat{e}_i) = \frac{\sigma\lambda}{1 + \lambda^2} \left(\frac{\phi(\lambda \hat{e}_i)}{\Phi(\lambda \hat{e}_i)} + \lambda \hat{e}_i \right) \tag{8}$$

$\hat{u}_i$ denotes inefficiency term of a bank, and $\hat{e}_i$ represents residual of regression; $\phi(\cdot)$ and

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[1] More details about DEA and stochastic frontier techniques, see Kalirajan & Shand (1999).

$\Phi(\cdot)$ are, respectively, the density and distribution functions of a standardized normal random variable.

3.2.2 INDEX FOR INEFFICIENCY OF REGIONAL BANKING SYSTEM

We then use a weighted average to construct an index for inefficiency of regional banking system in which weights are the proportion of loans by a specific bank for a region in total loans issued in that region. The data for the loans of each bank at each region is mostly extracted from "Year Book of Chinese Finance". For some relatively small-sized commercial banks, the Year Book does not give regional data; we then create the regional data through multiplying total loans of that bank for one year by the proportion of regional GDP in the GDP of the whole nation.

The index we propose for the inefficiency of banking system for each region is therefore defined as follows:

$$\overset{\Lambda}{\mu}_{jt} = \sum a_{ijt} \overset{\Lambda}{u}_{it(t+1)} \tag{9}$$

$\overset{\Lambda}{\mu}_{jt}$ denotes the value of the inefficiency for banking system of region j. And $\overset{\Lambda}{u}_{it(t+1)}$ represents the value of inefficiency for bank i from year t to $t+1$; α_{ijt} is the ratio between loans of bank i issued in region j and total loans region j received in year t.

4 SAMPLES AND DATA

Due to the difficulty of data collection, the sample herein just consists of 4 greatest state-owned banks, there of which have recently been converted to conventional commercial banks through the introducing of new non-government investors, and 10 middle-sized commercial banks. These 14 banks constitute the most part of Chinese banking sector, whose assets amount to nearly 75% of total assets of this sector as a whole. Taking account of data availability, small size or other reasons, we exclude policy banks, city commercial banks, urban and rural cooperative credit banks and branches of foreign banks in China out of the sample. The time horizon is from 1996 to 2009, which is the critical period for commercial banks' reform in China and with it we can look into the change of micro-efficiency of banks through the reform. The data is mainly extracted from "Year Book of Chinese Finance" and official information published in each bank's website, from which financial data of Guangdong Development Bank in 2009 is still unavailable; we then create a sample of this bank for 2009 by adjusting the data of 2008 adding the average alteration from 2006 to 2008 to each component. Table 1 below gives statistic description of the sample.

Table 1: Statistic Description of the Sample

variable	notion	Mean Value	Standard Error
RC	Real total cost	300.17	165.37
Q1	Balance of loan	5738.33	8220.21
Q2	Balance of investment	2390.54	4001.36
Q3	Non-interest proceeds	72.32	79.65
W1	Average cost of loanable funds	0.0201	0.01
W2	Average price of operation inputs	0.019	0.009

Source: "Year Book of Chinese Finance" (1999-2009) and official statistic data published in every bank's website.

Note: Q1 is the mean value of balance of loan in the observational year (deducted by non-performing loans). Q2 is the mean value of balance of investment, here including short-term investment, security investment, and long-term investment, deducted by reserve for loss of investment. Q3 is calculated as yearly earning deducted by interest proceeds. W1, W2 are index having no dimension. Other variables are in hundreds of million RMB.

5 ANALYTICAL RESULTS

5.1 THE COMPETITION LEVEL OF CHINA'S BANKING SYSTEM AND ITS EVOLUTION

To date, there have been two stages of reform in Chinese banking system, from 1979 to 1992, and from 1993 to present. Stage one began with the creation of a "two tier" banking system, consisting of the People's Bank of China (the central bank), and four state owned banks: the Bank of China (BOC), the Agricultural Bank of China (ABC), the China Construction Bank (CCB) and the Industrial and Commercial Bank of China (ICBC). Initially there was a high degree of functional segmentation between them. By 1985, they were allowed to accept deposits and make loans to households and corporate (mainly SOEs), via nation-wide branches. By 1986, most had expanded to universal banks, with trust, securities, and insurance affiliates.

Table 2: The Level of Competition (The Value of H) of Banking System in China, 1996-2009

	1996	1997	1998	1999	2000	2001	2002
P1	0.051	0.001	-0.113	0.121	0.003	0.137	0.49
P2	0.438*	0.483$	0.412$	0.503*	0.413*	0.431*	0.403
P3	0.274$	0.201$	0.132	0.034$	0.153*	0.045$	0.051*
H	0.763	0.685	0.431	0.658	0.569	0.631	0.944
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
P1	0.022	0.159	0.158	0.167	0.221	0.431	0.555
P2	0.598*	0.934$	0.799$	0.801	0.798*	0.997$	0.871$
P3	0.011*	0.137*	0.201$	0.211*	0.300*	0.243	0.355
H	0.632	1.23	1.158	1.179	1.319	1.311	1.532

Note: $ and * indicates the results are significant at 1% and 5% level of confidence.

Between 1985 and 1992, to promote more competition, the Chinese government permitted the establishment of new "small and medium sized" commercial banks, which initially offered banking services to households and firms, mainly in the regions and cities.

In 1993, the State Council announced a second stage of bank reforms in the "Decision on Financial System Reform". One objective was to create a competitive commercial banking sector where state banks co-existed alongside other forms of banking institutions.

From table 2, we can find that although the level of competition in China's banking system varies greatly from 1996 to 2009, but generally speaking, the competition level increases over time.

5.2 THE INEFFICIENCY OF CHINESE REGIONAL BANKING SYSTEM

Based on (9), we can calculate the inefficiency level of Chinese regional banking system as below:

Table 3：Value of Inefficiency of Banking System for Various Regions (Percentage)

	2004	2005	2006	2007	2008	2009
Beijing	7.1	5.77	6.3	5.31	4.63	4.53
Tianjing	6.75	6.9	8.1	6.21	6.23	6.83
Hebei	6.93	7.48	7.82	6.12	6.54	6.67
Shanxi	6.94	8.02	7.63	5.86	6.7	6.72
Neimenggu	6.67	7.69	7.07	5.26	6.19	6.07
Liaoling	7.01	7.67	7.71	6.31	6.57	6.83
Jiling	7.03	7.65	8.11	6.28	6.26	6.24
Heilongjiang	6.93	7.62	7.79	6.26	6.78	6.71
Shanghai	5.59	5.6	6.4	5.43	4.91	4.74
Jiangsu	6.23	5.83	6.86	5.68	5.46	5.51
Zhejiang	6.12	6.36	6.44	5.42	5.38	5.1
Anhui	6.76	7.72	7.73	6.25	6.64	7.27
Fujian	7.62	6.69	7.56	5.65	5.51	6.34
Jiangxi	7.96	7.79	7.83	5.96	6.34	6.25
Shandong	7.08	7.24	8.62	6.54	6.05	5.81
Henan	6.72	7.55	8.31	6.94	7.38	7.73
Hunan	6.96	7.24	8.82	6.83	6.44	6.78
Hubei	7.14	7.14	8.25	6.68	6.93	7.49
Guangdong	6.73	5.81	6.36	4.46	4.73	4.98
Guangxi	6.77	7.4	7.76	6.34	7.05	7.42
Hainan	7.26	6.62	10.97	9.25	7.69	7.81
Sichang	7.03	7.04	8.33	6.22	7.19	7.25
Guizhou	7.53	8.6	7.71	5.96	7.55	7.91
Yunnan	7.02	7.69	7.32	6.16	7.38	7.87
Xizang	7.87	7.79	6.83	5.42	8.36	8.74
Shanxi	7.84	8.53	8.3	6.9	7.49	7.86
Gansu	7.31	8.03	7.18	5.85	7.13	7.82
Qinghai	7.42	8.32	7.35	5.67	7	7.18
Ningxia	7.35	8.03	7.57	5.88	6.83	6.76
Xinjiang	7.67	8.4	8.09	6.61	7.55	7.75
Chongqing	6.86	7.59	7.16	5.36	6.8	6.83

We can reach some conclusions from table 3: Firstly, on average, during the former half period of 2004-2009, the efficiency of banking system for every region is quite low, while in the latter half period the value of efficiency is high, which discloses that a series of reform in banking sector recently launched begin to show its effects. Secondly, in the fastest growing regions, such as Beijing, Shanghai, Guangdong Province, etc., its efficiency of banking system is higher, while in Hubei, Guangxi, Hunan Provinces, etc., whose growth rate is relatively lower, its banking system's efficiency is lower as well.

5.3 THE RELATIONSHIP BETWEEN MARKET COMPETITION, LAW ENFORCEMENT AND BANKING SYSTEM'S EFFICIENCY IN CHINA

In order to capture the relationship between the competition level of China's banking system and its efficiency, we make a regression here: let the efficiency of China's banking system act as dependent variable, and take the competition level of banking system and other macroeconomic variable as independent variable. An important issue we are going to explore here is the role of environmental factors in the relationship between competition and banking system's efficiency. As the literature indicates, the effect of market competition on institutes' efficiency to some extent depends on some environmental factors. And among them, the efficiency of law enforcement is an important one. Intuitively, if the law enforcement is more efficient, the disputes or arguments between companies will be much easier to settle. As a result, market competition will lead to greater efficiency. In this paper, the variable, LAW, will proxy for the efficiency of law enforcement, which is the ratio of closed cases against total cases received by the regional courts.

In this way, we can partially verify the hypothesis in the introduction. If the parameter of competition level is positive, then it proves the "quiet life" hypothesis, i.e. the competition reduces the sloth of managers and enhances the efficiency of banking system. However, if the parameter is negative, then it shows that over competition in banking system hampers the bank-customer relationship and acts against the economic growth. From the beginning, we hypothesize that the efficiency of law enforcement could enhance the banking system's efficiency. So a positive coefficient of LAW is expected. The results of regression are as follows:

Table 4: The Relationship between Market Competition, Law Enforcement and the Banking System's Efficiency in China

	Dependent variable: Efficiency of banking system	
	Coefficient	T-statistics
GDP growth	3.22	1.48
Inflation	0.67	1.02
LAW	1.67**	3.11
Competition level of banking system	4.45**	3.89
Total assets of banking system	0.22*	1.98
R-Square	0.65	

Note: ** and * indicates the results are significant at 1% and 5% level of confidence.

As a result, the regression above shows that the "quiet life" hypothesis is supported in China's banking system. And the efficiency of law enforcement does indeed enhance the banking system's efficiency in China.

6 CONCLUSION AND EXTENSIONS

In this paper, we empirically demonstrate the relationship between the market competition, law enforcement and the banking system's efficiency in China. We find that the "quiet life" hypothesis maybe valid in China's financial market. Besides, in regions where the law enforcement is more efficient, the effect of market competition on banking system's efficiency is much more salient. Of course, this study is preliminary, and could be extended further. For example, we could use other methods to calculate the competition level and efficiency, and different results may emerge. Besides, we could study the causality between the competition and efficiency in banking system in the future, which should be very interesting indeed.

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