7th International Scientific Conference
"Business and Management 2012"
May 10-11, 2012, Vilnius, LITHUANIA

ISSN 2029-4441 print / ISSN 2029-929X online
ISBN 978-609-457-116-9 CD
doi:10.3846/bm.2012.006
http://www.bm.vgtu.lt

EVALUATION OF COMPETITIVE CONDITIONS IN THE PRC BANKING INDUSTRY

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Abstract. As a fundamental component to any country's overall economic system, People's Republic of China's (PRC) banking industry recently has seen rapid growth in line with the economic development of the country. This paper presents an empirical assessment of the market structure and the competitiveness of the Chinese banking sector particularly in the wake of China's accession to the WTO by employing the Panzar-Rosse *H*-Statistic as a non-structural model over the period 2004-2007. The empirical findings indicate that the banking sector in China was monopolistically competitive for the specified period. We also find that the Chinese banks, which operate in more monopolistic environments, are less efficient. The findings reject the state of conjectural variation short run oligopoly or natural monopoly in the industry for the period under consideration.

Keywords: banking, competition, Panzar-Rosse H-statistic, China.

Jel classification: G21, D43, L10, C51

1. Introduction

Banks have historically been a major source of capital for the economy and the primary choice for domestic savings. The PRC's banking industry comprises broad categories of banking institutions, namely joint stock commercial banks, urban commercial banks, urban credit cooperatives, rural credit cooperatives, foreign-invested commercial banks and other financial institutions. Financial liberalization, electronic and information, the influence of the global commercial bank management mode and the competition has been in the rapid development of the banks in China. In contrast, Chinese commercial banks organization system, market competition, management mode and the competition pattern of evolution, it is mainly composed of gradual economic and financial system reform promoting. Since the 1980s, Chinese reform and opening policy, for the development of the financial industry into strong vitality and vigor. The financial system, and realization from the reconstruction of finance macro-control of the financial departments to full-scale market reform, Chinese financial reform through an extraordinary development path. Along with the development of the entire financial reform, Chinese commercial Banks from growing and standardizes vibrant reform discourse.

In this study, we try to answer the question of how have the competitive conditions in the PRC changed the overall banking and regulations in the last decade particularly after the accession of the country to the World Trade Organization? Besides, the paper provides empirical evidence on the level and evolution of competition in the Chinese banking industry. This study also contributes to the literature on market structure in Chinese banking systems by using a larger sample of banks.

One of the most popular methods used to assess competition in the banking industry is the model of Panzar and Rosse (P–R). Seminal articles by Rosse and Panzar (1977), and Panzar and Rosse (1982, 1987) provide an excellent framework for assessing degrees of competition in the banking sector. However, the empirical translation of this

approach into an econometric specification is ambiguous and allows for some degrees of freedom. The P-R model uses cross-sectional data to assess the competitive behavior of banks based on the comparative static properties of reduced-form revenue equations. It explains revenues from input prices, among other factors. In this setting, the sum of the flexibility of a bank's total revenues to its input prices provides a pivotal statistic to test for monopoly and perfect competition. Moreover, under certain assumptions this statistic can also serve as a measure of the degree of competition in the banking sector.

The theory of contestable markets developed by Baumol, Panzar and Willig (1982) states that oligopolies and monopolies will sometimes behave very much like perfectly competitive firms (Baumol 1982). There have been few applications of the contestable markets theory to banking. Studies by Shaffer (1982, 1983, 1994), Nathan and Neave (1989) and Molyneux *et al.* (1994, 1996) are the most significant, among others such as Turk-Ariss (2008) and, Aktan and Masood (2010). They employed tests developed by Rosse and Panzar (1977), Panzar and Rosse (1987) to examine the competitive conditions in the banking sector in the U.S., Canada, Japan and Europe. Nathan and Neave (1989) found some evidence that the U.S and Canadian banking markets exhibit characteristics of contestability.

Literature has been developed which is mostly based on measuring competition using Panzar-Rosse approach. Molyneux, Thornton, and Lloyd-Williams (1996) report perfect collusion in the Japanese banking sector. An earlier study by Molyneux, Lloyd-Williams, and Thornton (1994) finds that monopolistic competition best describes the market structures in France, Germany, Spain and the UK. They could not, however, reject monopoly for the case of Italy, a result that was contradicted by Coccorese (1998).

The paper consists of five sections. First section presents a short motivation with the previous studies of P-R applications in the literature, Section 2 gives a brief overview of the Chinese banking sector, Section 3 demonstrates the Method and describes the data used in the paper, Section 4 shows the empirical findings obtained and the last section finally concludes with a short summary.

2. PRC's banking industry in brief

Banking industry in PRC has undergone significant changes especially in the last two decades and financial resources in China mostly are allocated through the banking system thus; the economic reforms of China are dominated by Chinese commercial banks. The measurement of profitability and competitive conditions of the banking system depicts the economic growth of China. Since 1978, the Chinese economy has experienced an impressive annual growth rate of about 10 %. China's financial assets have grown at the annual rate of about 18 %, or more than twice the growth rate of GDP.

Since the People's Republic of China was founded in 1949, the People's Bank of China (PBOC) has been the only bank in Mainland China until 1978. During this period, the PBOC played a dual role in China's financial system: as a central bank and as a commercial bank. Upon nationalization of private banks in the 1949, bank management in China essentially followed the approach of centrally planned economy.

During the period of 1953-1978, four of the Chinese banks had operated intermittently as separate units or as a single entity. During the period 1978-1984, the People's Bank of China (PBC), the Agriculture Bank of China (ABC), Bank of China (BOC), and the Construction Bank of China (CBC). During the period 1978-1984, the PBC retained the central banking activities, while four other banks—ABC, BOC, CBC, and ICBC (Industrial and Commercial Bank of China) were carved out from the PBC to provide specialized services. The modern Chinese banking system is comprise of four state-owned commercial banks, as well as several joint-stock commercial banks, city commercial banks, rural credit cooperatives, finance companies, and trust and investment companies, additionally foreign banks have been allowed to be an integral part of the banking system.

According to Commercial Banking Law of the People's Republic of China, which became effective in July 1 of 1995, one of the prerequisites to establish commercial banks is "Having directors and senior management personnel with professional knowledge for holding the post and work experiences". In June 2002, the People's Bank of China promulgated Guidance on Independent Directors and External Supervisors of Joint-Stock Commercial Banks, which aims to establish and enhance the arrangement of independent directors.

For Chinese banking, the most crucial issue is to convert the four state-owned commercial banks, with 70 % of the nation's financial assets and loans, into share-holding companies. During system-wide crisis, state-owned banks often become safe havens because the public perceives that their funds will be fully guaranteed by the state. The Chinese were underperforming their counterparts in other countries. In recent years, the Chinese government has carried out a series of reforms aimed at making banks more market driven, more

profitable, and well managed. One important reform among these is to establish a board of directors system in existing banks to improve corporate governance. In this context, how effective the role of the board of directors' has played in the profitability of Chinese banks which is up to close examination.

3. Methodology and aata

3.1. The Model

The analysis developed by Panzar and Rosse examines the relationship between input prices and equilibrium gross revenue derived from the theory of the firm under some assumptions about competitive conditions. They showed that the sum of the elasticities of the reduced form revenue function with reduced prices is a measure of competitive conditions.

They assumed long run equilibrium equations on firm's revenue and input price vectors. Their approach was to measure the effect of factor prices on the observed equilibrium values of total revenue *R*. If *R* is the observed revenue and w_i is the price of i^{th} input, where $i = 1, 2, 3 \ldots n$, then the test quantity of *H* (*The Panzar- Rosse H statistics*) is

$$P - R_H = \sum_{i=1}^{n} \frac{\delta R w_i}{\delta w_i R}, \qquad (1)$$

According to the Panzar-Rosse method, measure of market structure is calculated as the sum of the elasticities of total revenues of the bank with respect to its input prices. It is estimated from the following:

$$\ln(TR) = \alpha + \beta_1 \ln W_L + \beta_2 \ln W_F + \beta_3 \ln W_K + \gamma_1 \ln Y_1 + \gamma_2 \ln Y_2 + \gamma_3 \ln Y_3 + \varepsilon \qquad (2)$$

where:

TR – ratio of total revenue to total assets,

W_L – ratio of personnel expenses to total assets,

W_F – ratio of interest expenses to total deposits,

W_K – ratio of other operating and administrative expenses to total assets,

Y_1 – ratio of equity to total assets,

Y_2 – net loans to total assets,

Y_3 – total assets

Various assumptions are required to be made to apply to the Panzar-Rosse methodology such as, banks are treated as single product firms, acting exclusively as financial intermediaries that produce interest revenues using labor, capital and intermediated funds *(mainly deposits)* as inputs. Moreover, it is assumed that higher factor prices are not correlated with higher revenues generated by higher quality services, since this may bias the computed *H*-statistic.

$$\ln(ROA) = \alpha + \beta_1 \ln W_L + \beta_2 \ln W_F + \beta_3 \ln W_K + \gamma_1 \ln Y_1 + \gamma_2 \ln Y_2 + \gamma_3 \ln Y_3 + \varepsilon, \qquad (3)$$

where:

ROA – return on assets

In the P–R framework, banks should be observed from a long-run equilibrium perspective. The equilibrium statistic *E* is calculated as the sum of the input price elasticities, and the hypothesis that its value is 0 is tested where, if rejected, the market is not in equilibrium.

3.2. Data

The data used in this study were obtained from Datastream and also collected from 16 major banks of the PRC including the Agricultural Bank of China, the Agricultural Development Bank of China, the China Development Bank, the China Merchants Bank, the Bank of Communications, the Indrustrial and Commercial Bank of China, China Everbright Bank, China Construction Bank, Bank of China, Huaxia Bank, The Export-Import Bank of China, the Shenzhen Ping An Bank, the Shenzhen Development Bank, Xiamen International Bank, Minsheng Bank, and Shanghai Pudong Development Bank. The dataset was developed by collecting the information related to these banks covering the period 2004–2007. The regression analysis was performed on this pooled data to obtain the results.

4. Empirical analysis

The equilibrium tests and the competitive conditions tests for pooled data regressions on the data sample for Chinese banks over a period of 2004-2007 are shown in the Tables 1 and 2 respectively. The equilibrium conditions are tested using the estimation of lnROA. The results show that it yields a R– squared value of 0.39. This suggests that the variables that we use have a very small impact on the variation in lnROA. We also observe that the regression coefficients $\ln W_L$, $\ln W_F$ are negative and $\ln W_K$ is positive, with $\ln W_F$ significant at 5 % level.

Table 1. Equilibrium Test Results for Chinese Banks for 2004–2007 (Depended Variable-lnTR) (Source: made by authors)

Coefficients	China
$\ln W_L$	-0.022 (0,006)
$\ln W_F$	-0.036 (0,016) **
$\ln W_K$	0.004 (0,001)
$\ln Y_1$	0.026 (0,017) *
$\ln Y_2$	0.021 (0,002)
$\ln Y_3$	-0.009 (0,004)**
R^2	0.39
E-statistic	-0.051 (0.02) *
equilibrium E=0	Reject*

-*** and **denotes that the values are significant at 10 % level and 5 % level respectively
-Robust standard errors are reported in parentheses

From the above Table 1 we observe that E-statistic of –0.051. This enables us to reject the null hypothesis at 1 % level. We tested by running a rolling regression of a 4-year window with the aim of identifying whether the banking market was in equilibrium or not. We found that that market equilibrium over the full sample period is questionable and hence we are unable to confirm whether the data is in long rum equilibrium over the period 2004–2007.

The competitive conditions are tested using the estimation of lnTR. The results show that it yields a R– squared value of 0.64. This suggests that the variables that we use have a very small impact on the variation in lnTR. We also observe that the regression coefficients $\ln W_L$, $\ln W_F$ and $\ln W_K$ are positive, with $\ln W_L$ significant at 10 % level (see Table 3). From Table 2 we observe that H-statistic (0.561) can be calculated from our dataset. This enables us to reject the null hypothesis at 1 % level. The banking sectors in China are traditionally highly concentrated markets; their markets structure is generally monopolistically competitive and not characterized as a monopoly. A monopolistic competition structure is the existence of product differentiation in banking and with the fact that banks tend to differ with respect to product quality and advertising. By our results we can conclude that market power resulting from high concentration levels does not exclude competitive behavior. This suggests that the degree of competition in banking may be affected by different factors for differences.

Table 2. Competitive Conditions Test Results for Chinese Banks for 2004–2007 (Depended Variable- lnTR) (Source: made by authors)

Coefficients	China
lnWL	0.212 (0.035)***
lnWF	0.472 (0.049)
lnWK	0.079 (0.019)
lnY1	0.063 (0.047)
lnY2	−0.007 (0.055)
lnY3	0.068 (0.029)**
R2	0.64
PR H-statistic	0.561 (0,072)
Monopoly H=0	Reject***
Perft. Comp. H=1	Reject***

-*** and **denotes that the values are significant at 10 % level and 5 % level respectively.
-Robust standard errors are reported in parentheses

Now we consider the factors, which affect the degree of competition. The sample consists of panel data for the individual profiled countries over the period 2004–2007. The models are estimated following equation given below.

$$H_i = a + bC_i + e, \qquad (4)$$

where:

Hi – degree of competition,
Ci –vector of variables

The variables are obtained from Barth, Caprio, and Levine (2007), Economist Intelligence Unit Country Profiles and R. Turk-Ariss (2008). C_i is classified into two categories, including sector control factors and indicators of banking structures. Sector control variables include three variables efficiency, profitability and capitalization levels whereas indicators of banking structures include bank concentration foreign ownership. The descriptions of the variables are as: Efficiency: Ratio of non-interest expense to the sum of net interest income and non-interest revenues. A higher ratio indicates lower efficiency; Profitability: Return on Assets (the ratio of net income to total assets) and Return on Equity (the ratio of net income to total equity). Capitalization; Ratio of equity to total assets; Concentration: A measure of the degree of concentration in the banking industry, calculated as the fraction of deposits held by the largest three commercial banks in China. Foreign Ownership: Fraction of the banking system's assets that is in banks that are 50 % or more foreign owned as of fiscal year 2007. The estimation results on these variables reported in Table 3.

Table 3. Regression Results on the Data

Variable	Panel A: Yearly H-Statistic			Panel B: Overall H-Statistic		
	Model-1	Model-2	Model-3	Model-1	Model-2	Model-3
Efficiency	−0.1229 (0.1837)		−0.9794 (0.4267)**	−1.7874 (0.5194)*		−1.3043 (0.4624)*
Profitability	−0.2993 (0.1723)		−0.4583 (0.3438)*	−0.2351 (0.2468)		−0.2219 (0.1935)*
Capitalization	−4.8081 (1.6819)*		−4.1198(1.2941)*	−0.3817 (0.7465)		-0.81629 (0.3812)
Concentration		−0.5166 (0.2623)*	−0.5723 (0.4771)		−0.2783 (0.2029)	0.7298 (0.4385)
Foreign Ownership	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Constant	0.3046(0.6386)	0.4369 (0.5329)	0.3897 (0.3912)	0.5768 (0.4905)	0.6118 (0.2883)	0.5493 (0.6315)

–***, ** and * denotes that the values are significant at 10 % level, 5 % level and 1 % respectively.
–Robust standard errors are reported in parentheses (Source: made by authors)

Panel A considers the yearly derived H-statistic as dependent variable, and panel B uses the overall H-statistic as the dependent variable. We observe that the sign of all the models-the sigh of the sector controlled variables is negative. This indicates that Chinese banks, which operate in more monopolistic environments, are also less efficient. Our findings are similar to R. Turk-Ariss (2008) but different to Casu and Girardone (2006), who argue that banks in more competitive markets are also more efficient. The profitability has negative sign in all the models, indicating that banks were not able to achieve high records of profitability in monopolistic monopolistically competitive markets.

The capitalization is also found negative, which suggests that indicating that lesser capitalized banks also operate better in competitive markets. We observe a negative but insignificant relationship between concentration and competition. This indicates that the degree of competition increases with increases in market concentration across Chinese banking sectors. It can therefore be concluded that due to concentration in the Chinese banking system in the last few years, the market power for the leading firms have reduced. Our results are in line with Casu and Girardone (2006) but opposite to Claessens and Laeven (2004) who found a positive association between concentration and competitation.

5. Concluding remarks

In this study, we employ a non-structural approach suggested by Rosse and Panzar (1977) and, Panzar and Rosse (1982, 1987) so-called H statistic that has been widely used in order to measure the competitive conditions of the PRC Banking industry during the period of 2004–2007.

The empirical findings of the study revealed that the banking sector in PRC for the period examined is monopolistically competitive. The findings reject the state of conjectural variation short run oligopoly or natural monopoly in the system for the period.

In addition, we find that the Chinese banks, which operate in more monopolistic environments, are less efficient.

The Chinese banks are not able to achieve high records of profitability in monopolistically competitive markets. The findings suggest that lesser capitalized Chinese banks also operate better in competitive markets.

The study also indicates a negative but insignificant relationship between concentration and competition.

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