



# Bank Competitive Condition and Bank Performance, Evidence from Emerging Markets

Lebin Huang

Philippine Christian University, Manila, Philippine  
\*Correspondence: 348154542@qq.com

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**Abstract:** This paper verifies the level of bank competition and the relation between bank competition and bank performance of four emerging market countries which include Brazil, Russia, India and China. The data is selected from the BankScope database and consists of 692 banks' information during 2000 to 2014. The final regression results declare that the bank market of China, Russia and Brazil are under the monopolistic competition, while the bank market in India is in the monopoly. Moreover, the bank competition is negatively associated with the bank performance through the investigation. In this case, these countries can use rational government regulation to restricts the vicious competition. Encouraging the improvement of bank's governance structure and management efficiency so as to response to the adverse impact from competition.

**Keywords:** bank competition, bank performance, emerging markets

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## Introduction

Emerging market refers to that relative to the mature or developed markets, those countries, regions or economies which have some same characteristics, but does not actually meet the standard. During these years, the emerging market countries and regions become a significant power of global economic growth, and they may have great impacts on nowadays' global economy. As the cornerstone of global financial system, banks and their effects have been a focus over several decades, especially in those emerging market countries. Through Bloomberg, measured by market capitalization, 4 of world's top 10 banks were from the BRICs (Brazil, Russia, India, and China) which are the representatives of the emerging market countries. In addition, in the world's top 100 banks, 44% of them were from developing countries. Therefore, it is important to investigate the banking industry's competitive condition and how does the bank competition affects the bank performance in emerging markets.

According to previous researches, the bank competitive condition is closely related to the bank performance. However, those theoretical and empirical studies do not achieve an agreement, a controversial debate still exists in this topic. Considering the relation between bank competition and performance, the structure-conduct-performance(SCP) hypothesis argues that the bank competitive condition will influence the banking market concentration, and then take impact on the bank performance. Smith found that the countries have competitive banking system will has higher national income and better bank revenue than the countries have monopolistic banking system [18]. The paper of Beck et al. stated that increase the level of competition among banks will decline the risk of bank and beneficial to the bank performance [3]. To the contrary, the empirical study of Yeyati and Micco said that the increasing bank competitive level will leads to the increasing of risks sustained by the decision-making level of banks [19]. Hence, the whole banking system may be suffered by the crisis of high risk and loss. Under this circumstance, this paper will based on those precious studies and use latest data and information to investigate this topic.

The next section will introduce the theoretical framework and some previous literature about this topic. In section three, the methodology of this research will be discussed, which consists of detailed description of hypothesis, empirical model and variables. The fourth part will state the data used in this research and provide a descriptive statistics about the data. The

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section five will show the results of the investigation, furthermore, analyzing the explaining the relationship between bank competition and performance. Finally, the last section will give a brief conclusion about the whole report.

### **Literature Review**

The structure-conduct-performance (SCP) is the basic theory of numerous early studies on banks' market structure. It assumes that the profitability of a banking firm is dependent upon the market structure and the degree of competition [8][9]. The basic message of the SP hypothesis is that the higher concentration ratio will result in the higher level of profitability. Collusive behavior increased the profitability performance of the firms which include banks. Therefore, the bank concentration level is positively related to the firm's performance through the SCP hypothesis. In other words, the level of competition will be adversely related to the firm's performance. To the contrary, the efficiency structure hypothesis (ESH) focuses on the efficiency of the firm. It considers the most significant factor to explain the firm's profitability is the efficiency. Through the efficiency structure hypothesis, the correlation between concentration and profitability is not significant [17]. If a firm has higher efficiency than its competitors, it will earn more profits and gain more market shares.

Similar with the SCP hypothesis, the competition-fragility hypothesis argues that the banking system with higher competitive condition and lower concentration may more prone to leads to financial fragility. Boyd and Prescott illustrate that larger banks always have better economies of scale and scope, the concentrated banking industry which consists of larger banks will achieve better performance [6]. Moreover, banks will get less informational rent from their borrowers when the banking market is more competitive. Under this circumstance, those banks will loosen the proper investigation on the borrowers, which may increase the credit risk of banks and financial instability [1]. From the research of Yeyati and Micco, the bank competition has a positive relationship with the bank risk [19]. The data sample of their study was collected from eight Latin American countries during 1993 to 2002. They use H-statistic to measure the level of bank competition while adopt Z-score to represents the bank risk. The result of the research argued for the competition-fragility hypothesis.

In the meantime, Jimenez et al. tested the association between bank competition and loan portfolio risk in Spanish banking system [11]. In this research, the Lerner Index is applied to measure the bank competitive condition, and the results show that the higher level of bank competition will lead to higher loan portfolio risk in Spain. Berger et al. also use Lerner Index as the indicator of bank competition level. They selected sample from 8235 banks in 23 developed countries from the period 1999 to 2005. The results are accord with competition-fragility hypothesis, which suggests that the banks with stronger market power will have lower overall risk exposure [4]. It means that higher concentrated banking system represents lower competitive condition and then results in better performance. Furthermore, the results of Fu et al.'s study also provide similar conclusion. They investigated the data from 14 Asia Pacific economies over 2003 to 2010, and found that the Lerner Index is significantly negatively related to the individual bank risk [7]. In other words, there is a significant positive correlation between bank competition and bank risk.

On the other hand, some scholars declare that the banking system with more competition and less concentration will more stable. This argument is known as competition-stability hypothesis. Mishkin put forwarded the 'too big to fail' theory which claims that when the banking system is highly concentrated and there is only exist few large banks in the market, the regulators will attach more importance to the bank failure [13]. Therefore, the regulators or government will provide some guarantees or subsidies to those larger banks. It may lead to moral hazard problem, and then increase risks and possibility of financial instability. In a concentrated banking system, the large banks may charge higher interest rate on loans. In this case, the borrowers will bear higher risk when they borrow money from banks. Thus, the risk of non-performing loans of large banks will rise and the possibility of bank failure will also increase [5].

In 2013, Amidu and Wolfe examined the correlation between competition, diversification and bank stability by using the data from 978 banks in 55 emerging and developing countries during 2000 to 2007. In this research, they adopt Lerner Index to measure competitive condition and use Z-score, ROA and ROE to represent the bank stability [2]. The results indicate that the bank competition will beneficial to the bank stability and then enhance the bank performance. The paper of Hou et al. investigated data from 44 major Chinese commercial banks during 2007 to 2011. They found that higher level of competition will stimulate the development and improvement of professional skills and technology, then leads to greater efficiency [10]. From the efficiency structure hypothesis, the higher efficiency will help firms get higher profitability.

Overall, these previous researches do not achieve an agreement on the association between bank competition and performance. So, this research will continue focus on how does the bank competition influence the bank performance.

### **Theoretical Framework**

In order to consider the bank competitive condition of these four emerging countries, the model in this paper will follow the research of Matthews, Murinde and Zhao [12]. In their study, the Panzar-Rosse approach which proposed by Rosse and Panzar is applied to calculate the H-statistic and measured the level of competition [14][15][16]. This approach is derived from profit-maximizing equilibrium assumption and suitable for the firm-specific data and small samples. It is comply with

the situation and objectives of this study. Based on this study, the model be used to measure the bank competitive condition in this paper can be summarized as following.

Competition testing model:

$$\ln INT_{it} = \alpha + \beta_1 \ln PL_{it} + \beta_2 \ln PK_{it} + \beta_3 \ln PF_{it} + \beta_4 RISKASS_{it} + \beta_5 \ln ASSET_{it} + \beta_6 PROVISION_t + \epsilon_{it} \quad (1)$$

$$\ln INT_{it} = \alpha + \gamma_1 INT_{it-1} + \beta_1 \ln PL_{it} + \beta_2 \ln PK_{it} + \beta_3 \ln PF_{it} + \beta_4 RISKASS_{it} + \beta_5 \ln ASSET_{it} + \beta_6 PROVISION_t + \epsilon_{it} \quad (2)$$

$$H \text{ statistic} = \beta_1 + \beta_2 + \beta_3 \quad (1.1)$$

Equilibrium testing model:

$$\ln ROA_{it} = \alpha' + \beta_1' \ln PL_{it} + \beta_2' \ln PK_{it} + \beta_3' \ln PF_{it} + \beta_4' RISKASS_{it} + \beta_5' \ln ASSET_{it} + \beta_6' PROVISION_t + \omega_{it} \quad (3)$$

$$E \text{ statistic} = \beta_1' + \beta_2' + \beta_3' \quad (3.1)$$

**Table 1 Variables descriptions**

Variables	Descriptions
<b>Dependent variables</b>	
INT	Net interest revenue/total assets
ROA	The sum of total profits and financial expenses over total assets
IR	Total interest revenue
<b>Independent variables</b>	
• Explanation variables	
PL	Personnel expenses/total assets
PK	Capital assets /fixed assets
PF	Total interest expense/total deposits and money market funding
LERNER	Lerner index
• Control variables	
RISKASS	Total loan loss provision/total assets
ASSET(SIZE)	Total assets
PROVISION	Total loan loss provision/total loans
LOANS	Total loans/total assets

DEPOSITS	Total customer deposits/total liabilities
GDP	Annual rate of GDP growth

Most previous researches usually use return on total assets as the dependent variable in their model. It is calculated by total revenue or total interest income to the total asset. In this essay, the ratio of net interest revenue to total asset which is expressed as INT is applied as the dependent variable. In the equilibrium testing model, the dependent variable will be represented by the natural logarithm of ROA, which is consistent with the paper of Matthews, Murinde and Zhao[12]. Following these literatures, the independent variables consist of two parts. First is the explanatory variable like PL, PK and PF, which are used to calculate the H-statistic. The other is the control variables which are on behalf of specific bank conditions. PL is the labour cost which is measured by the ratio of personnel expense to total assets. PK is the ratio of capital asset to the fixed asset, and PF is the ratio of annual interest expense to the total deposits and money market funding. Meanwhile, the RISKASS represents the ratio of loan loss provisions to the total assets, ASSET is the bank size reflected by the natural logarithm of total asset, and PROVISION is measured by the ratio of loan loss provisions to total loans. The above descriptions of variables will be summarized in table 1.

**Table 2 Description of H-statistic and E-statistic**

Competition testing	
$H \leq 0$	Perfect monopoly
$0 < H < 1$	Monopolistic competition
$H = 1$	Perfect competition or perfect contestability
Equilibrium testing	
$E < 0$	Disequilibrium
$E = 0$	Equilibrium

Furthermore, the coefficient  $\alpha$  is the intercept of the formula, meanwhile the  $\beta$  and  $\gamma$  are the coefficient correlation which measure the corresponding change in performance when the competitive condition changes. The subscript  $i$  and  $t$  means the bank  $i$  and time  $t$ , separately.  $\epsilon$  and  $\omega$  are the error terms and  $\ln$  represents the natural logarithm of the data. Through the literature from Panzar and Rosse, if the market is in long run equilibrium, the model 1 will be used to measure the bank competition condition. Otherwise, the model 2 should be applied in order to get the results. The descriptions of H-statistic and E-statistic are shown in table 2.

After obtaining the bank competitive condition by using the Panzar-Rosse method, this paper will then use the Lerner Index to measure the bank competition level and test the relationship between bank competition and performance. The multivariate regression model used in this research is on the basis of the paper of Fu et al. [7]. The main model in this paper is as follows:

$$\text{Performance} = \alpha + \beta_1 \text{LERNER}_{it} + \beta_2 \text{LOANS}_{it} + \beta_3 \text{DEPOSIT}_{it} + \beta_4 \text{SIZE}_{it} + \beta_5 \text{GDP} + \epsilon_{it} \quad (4)$$

The brief explanation of the above variables is also stated in table 1. In this model, the dependent variable is the bank performance which is represented by the index ROA and IR. IR is the natural logarithm of the total interest revenue. Referring to the explanatory variable, this model adopts the Lerner Index (LERNER) to measure the level of competition, which is in accordance with numerous studies mentioned above. The Lerner Index is the ratio of the difference between price and marginal cost to the price. It can be used to measure the capacity of price power. The statistic of the Lerner Index is always in the range from 0 to 1, and the increase of the Lerner Index implies the decrease of the degree of competition. When the Lerner Index is equal to 0, the market is in a perfect competition. Whereas, when the Lerner Index is 1, the market is in a monopoly. If the Lerner Index is less than 0, it means that the price is below the marginal cost. The formula of the Lerner Index is as follows:

$$\text{LERNER}_{it} = (P_{it} - MC_{it}) / P_{it} \quad (5)$$

Where  $P_{it}$  is represented by the ratio of bank total revenues include interest income and non-interest income to the total assets.  $MC_{it}$  is the marginal cost of the bank. It can be derived by the following functions.

$$\ln TC_{it} = \beta_0 + \beta_1 \ln TA_{it} + \frac{1}{2} \beta_2 (\ln TA_{it})^2 + \sum_{j=1}^3 \lambda_j \ln W_{j,it} + \frac{1}{2} \sum_{j=1}^3 \sum_{k=1}^3 \lambda_{jk} \ln W_{j,it} \ln W_{k,it} + \sum_{j=1}^3 \delta_j \ln TA_{it} \ln W_{j,it} + \gamma_1 Trend + \frac{1}{2} \gamma_2 Trend^2 + \sum_{j=1}^3 \gamma_3 Trend \ln W_{j,it} + \gamma_4 Trend \ln TA_{it} + \varepsilon_{it}$$

(6)

$TC_{it}$  is the total costs of the bank and  $TA_{it}$  is the total assets.  $W_{j,it}$  is price of the production's factors, which consist of funding price ( $W_1$ ) which calculated as interest expenses divided by the total deposits, labour cost ( $W_2$ ) which is the ratio of personnel expense to the number of employees, and capital price ( $W_3$ ) which is the operating expenses divided by the fixed assets. Trend represents the change of the technology and measured by the time trend.  $\varepsilon_{it}$  is the error term. Besides that, the formula should meet requirement of symmetry restrictions,  $\lambda_{jk} = \lambda_{kj}$ . After that, the stochastic cost frontier approach will be used to calculate the marginal costs in equation (7).

$$MC_{it} = \frac{\partial TC_{it}}{\partial TA_{it}} = \frac{TC_{it}}{TA_{it}} (\beta_1 + \beta_2 \ln TA_{it} + \sum_{j=1}^3 \delta_j \ln W_{j,it} + \gamma_4 Trend) \quad (7)$$

Substituting the  $MC_{it}$  into the equation (5), the Lerner Index can be achieved.

In addition to the explanatory variable Lerner Index, there are four control variables in the regression model. They are also important to the regression analysis and can help to control the effects of other characteristics from both inside and outside of the bank on its performance. The bank specific indicators are constitute with ratio of total loans to total assets (LOANS), ratio of total customer deposits to total liabilities (DEPOSIT) and total asset of the bank (SIZE). Meanwhile, the overall macroeconomic factor measured by the annual rate of GDP growth (GDP).

Combining with above models and analyses, the main hypotheses in this research are:

$H_1$ : The bank competitive condition of these emerging market countries from 2000 to 2014 is monopolistic competition.

$H_2$ : The bank competitive condition will has negative impact on the bank performance.

### Data Analysis

The data of this paper is selected from the BankScope database, which is a comprehensive database for people collect data and information about banking industry. The sample includes annual financial data from all banks in four emerging market countries (Brazil, Russia, India and China) over the period 2000 to 2014. The panel data will reflects the change of competition degree and the change of market structure during these years. The incomplete data and extreme value have been removed from the sample so as to ensure the accuracy of the results. Finally, there are 692 set of observations would be tested in this research after excluding the useless data. In this report, all calculating and organizing processes are done by the Excel and EViews.

The table 3 provides the summary of statistics about observations from these emerging countries from 2000 to 2014. It consists of the variables from equation (1), equation (3) and equation (4). From this table, it is clear that the mean of all dependent variables are positive. The average of INT and IR are both around 12. This signifies that most of those banks in emerging countries are perform well during these years. Moreover, the average number of Lerner Index is 0.3828 which between 0 and 1. And the maximum and minimum amounts of Lerner Index are 0.7267 and 0.0164. This manifests that the banking systems in those countries are in the monopolistic competition.

**Table 3** Statistic description

Variable	Mean	Std. Dev.	Medium	Maximum	Minimum
Dependent variables					

INT	12.5936	1.9479	12.4793	18.2060	4.0511
ROA(Eq.3)	1.2059	3.0381	1.142	28.177	-65.144
ROA(Eq.4)	1.3260	1.9039	1.1760	36.0700	-8.3290
IR	12.7701	2.3125	12.3850	18.2060	7.3513

Explanatory variables					
PL	-4.4172	0.7424	-4.4171	-2.2355	-8.0997
PK	-2.1741	0.5447	-2.1866	0.2901	-7.6235
PF	-2.7405	1.0921	-2.8257	1.7796	-7.8439
LERNER	0.3828	0.1002	0.3833	0.7267	0.0164

Control variables					
RISKASS	-2.1726	0.5850	-2.1533	-0.5441	-4.7744
ASSET	15.8258	2.1319	15.5950	21.9376	9.9769
PROVISIONS	-0.7976	0.6895	-0.7856	2.1282	-3.5478
LOANS	0.0690	0.1170	0.0231	0.7293	0.0000
DEPOSITS	0.6725	0.2580	0.7701	0.9679	0.0001
SIZE	16.1298	2.4853	15.7034	21.9376	10.3616
GDP	6.0315	3.5863	6.9000	14.2000	-7.8000

Table 4 displays the correlation matrix among these variables in the main model. According to this table, the Lerner Index is positive related to both IR and ROA. However, the correlations of both coefficients are less than 0.1. It suggests that the correlation between Lerner Index and IR and ROA may not strong. Besides that, these control variables also influence the bank performance in different levels from this table. For example, the bank size and GDP growth rate will have great positive impacts on the bank interest revenue. After analyze the samples, the next section will provide more detail results and discussion about the bank competitive condition and relationship between degree of competition and performance.

**Table 4 correlation matrix( next page)**

Variables	IR	ROA	LERNER	LOANS	DEPOSITS	SIZE	GDP
<b>IR</b>	1.0000						
<b>ROA</b>	-0.0463 (-1.22)	1.0000					
<b>LERNER</b>	0.0832** (2.19)	0.0586 (1.54)	1.0000				
<b>LOANS</b>	0.0284 (0.75)	0.0683* (1.80)	-0.1509*** (-4.01)	1.0000			
<b>DEPOSITS</b>	0.0214 (0.56)	-0.1283*** (-3.40)	0.1120*** (2.96)	-0.5693*** (-18.19)	1.0000		
<b>SIZE</b>	0.9787*** (125.21)	-0.0822** (-2.17)	0.0703* (1.85)	0.0019 (0.05)	0.0789** (2.08)	1.0000	
<b>GDP</b>	0.2809*** (7.69)	-0.0405 (-1.06)	0.1264*** (3.35)	-0.0470 (-1.24)	0.2643*** (7.20)	0.3544*** (9.95)	1.0000

Notes: the figures in parentheses are the T-statistics of variables. \*, \*\* and \*\*\* means the significant level at 10%, 5% and 1%, respectively. The descriptions of those abbreviations are stated in the table 1.

### Regression Results and Discussion

For the purpose of verify the hypotheses, this report uses EViews to investigate above models to found the final results about the bank competition and the association between competition and performance. The table 5 shows the results about whether those four countries' banking industries are in the long-run equilibrium during 2000 to 2014. It is obvious that the E-statistic of China, Russia and Brazil are not significant different from 0. It means that the banking markets in these countries are in long-run equilibrium through the Panzar-Rosse method. However, the Wald test shows that the E-statistic of India is pass the significant test. The market is not in a state of equilibrium. Thus, the model 2 should be adopted to calculate the degree of bank competition when the market is not in equilibrium.

	<b>CHINA</b>	<b>RUSSIA</b>	<b>INDIA</b>	<b>BRAZIL</b>	
<b>Intercept</b>	0.7514 (1.51)	0.1468 (0.07)	-6.1794*** (-7.73)	-0.1959 (0.13)	
<b>PL</b>	0.0382 (0.67)	-0.0047 (-0.01)	-0.7627*** (-5.39)	-0.2584 (-1.26)	
<b>PK</b>	0.3087*** (4.94)	0.7478* (1.74)	0.1985*** (3.00)	1.1358*** (3.97)	
<b>PF</b>	-0.2801*** (-4.01)	-0.1641 (-0.69)	-1.1362*** (-8.37)	-0.1665 (0.94)	
<b>RISKASS</b>	-0.0702 (-0.95)	-1.0250** (-2.28)	-0.3511*** (-2.65)	-1.5409*** (-4.67)	
<b>ASSET</b>	0.0037 (0.33)	-0.0299 (-0.24)	0.0058 (0.22)	0.0175 (0.22)	
<b>LOANS</b>	0.0290 (0.549)	-0.2963 (-0.83)	0.0373 (0.42)	0.7728*** (2.94)	
<b>R<sup>2</sup></b>	0.1204	0.0371	0.4474	0.0717	
<b>AdjR<sup>2</sup></b>					
<b>P&gt;F</b>	0.1020	0.0262	0.4323	0.0600	
<b>E=0</b>	0.0000	0.0026	0.0000	0.0000	
	F(1,286)=0.4574	F(1,530)=0.9590	F(1,220)=60.5964***	F(1,476)=2.7504*	

Notes: the figures in parentheses are the T-statistics of variables. \*, \*\* and \*\*\* means the significant level at 10%, 5% and 1%, respectively. The descriptions of those abbreviations are stated in the table 1.

After test the equilibrium condition of the banking market, the Panzar-Rosse methodology can be used to find the competitive condition of the bank system. The model 1 is used to test the date from China, Russia and Brazil while the data of

India is tested by the model 2. The final results of competition test are stated in the table 6. From the table, it is clear that the H-statistics of China, Russia and Brazil are located between 0 and 1 and all of them are reject the hypotheses H=0 and H=1 at 1% significant level. This suggests that the bank markets in these three countries are under the monopolistic competition over the period 2000 to 2014.

To the contrary, in India, the H-statistic accept the hypothesis H=0, while reject another hypothesis H=1, because only the latter one pass the test of significance at 1% level. In this case, the banking market in India from 2000 to 2014 experiences the perfect monopoly. The possible reason to explain the above results are that these four emerging countries are developed well during these years. Many new banks established and lots of foreign banks enter into their market. Along with the increase of the amount of banks, the degree of competition in bank systems is increase. Referring to India, the number of banks is lower than other four countries. The monopolistic condition in bank market may due to the lower openness and bank quantity in India. And the small data size of India may also affect the final result.

**Table 6 Result of competition testing with dependent variable lnINT**

	CHINA	RUSSIA	INDIA	BRAZIL	
<b>Intercept</b>		-1.6709*** (-6.18)	-0.0626 (-0.28)	-2.4477*** (-6.05)	0.7473*** (2.63)
<b>INT(-1)</b>				-0.0087 (-0.29)	
<b>PL</b>		0.2983*** (9.59)	0.4581*** (12.81)	0.1323* (1.82)	0.1206*** (3.26)
<b>PK</b>		0.1308*** (3.85)	0.2959*** (6.64)	0.1293*** (3.69)	0.2772*** (5.26)
<b>PF</b>		-0.1772*** (-4.67)	-0.0189 (-0.76)	-0.4242*** (-6.48)	0.0660** (1.99)
<b>RISKASS</b>		0.2093*** (5.19)	0.4329*** (9.27)	0.2512*** (3.92)	0.5685*** (9.34)
<b>ASSET</b>		0.9799*** (163.88)	1.0092*** (78.06)	0.9523*** (27.71)	0.9246*** (63.99)
<b>LOANS</b>		-0.0549* (-1.88)	-0.0456 (-1.23)	-0.0448 (-1.04)	0.1361*** (2.81)
<b>R<sup>2</sup></b>		0.9896	0.9278	0.9720	0.9050
<b>AdjR<sup>2</sup></b>					
<b>P&gt;F</b>		0.9894	0.9270	0.9710	0.9038
<b>H=0</b>		0.0000 F(1,286)=21.9499* **	0.0000 F(1,530)=143.858 ***	0.0000 F(1,188)=2.2121	0.0000 F(1,497)=34.8418 ***
<b>H=1</b>		F(1,286)=193.5786 ***	F(1,530)=18.6814 ***	F(1,188)=112.9753** *	F(1,497)=46.5880 ***
<b>H</b>		0.2519	0.7351	0	0.4637

Notes: the figures in parentheses are the T-statistics of variables. \*, \*\* and \*\*\* means the significant level at 10%, 5% and 1%, respectively. The descriptions of those abbreviations are stated in the table 1.

The table 7 compares the results from different competition measures, H-statistic and Lerner Index. As we know, higher H-statistic implies higher bank market competition. In contrast, the Lerner Index increase indicates the degree of bank market competition decrease. Comparing the H-statistics and Lerner index of these four countries, the results of those two measures roughly obtain the same conclusion.

**Table 7 Compare the H-statistic and Lerner Index**

	China	Russia	India	Brazil
<b>H-statistic</b>	0.2519	0.7351	0	0.4637
<b>Lerner Index(Mean)</b>	0.3799	0.3313	0.4444	0.3777

The table 8 and Table 9 provide the results of the main regression model, equation 4. It is verifies the relationship between bank competition and performance by using Lerner Index and performance measures- ROA and IR. From the table 8, it is obvious that the Lerner Index has strong positive relationship with the bank performance indicator ROA. These coefficients of four countries all pass the test of significant at 1%, while the regression coefficient of total sample is at the 5% level of significance. This result declares that the bank competition condition is harmful to the bank performance. When Lerner Index increase, the degree of competition will decrease, and then the bank performance will better.

**Table 8 Regression result with dependent variable ROA**

CHINA	INDIA	BRAZIL	RUSSIA	TOTAL
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<b>Intercept</b>	0.6609* (1.68)	2.6544*** (6.27)	0.0600 (0.04)	1.9088 (1.05)	2.2265*** (3.79)
<b>LERNER</b>	2.0268*** (4.79)	2.4593*** (5.48)	5.4132*** (3.06)	1.2176*** (4.61)	1.71334** (2.36)
<b>LOANS</b>	-0.7178* (-1.94)	0.3365 (0.68)	-1.6000 (-0.53)	-1.5802 (-0.75)	0.0169 (0.02)
<b>DEPOSIT</b>	-0.8518*** (-2.73)	-1.3487*** (-5.81)	0.7062 (0.68)	-1.5412 (-1.44)	-0.9690*** (-2.74)
<b>SIZE</b>	0.03675*** (2.64)	-0.1169*** (-4.36)	-0.0338 (-0.35)	0.0009 (0.01)	-0.0589* (-1.90)
<b>GDP</b>	-0.0401*** (-3.13)	0.0206 (1.09)	0.0276 (0.28)	0.0721 (1.44)	0.0062 (0.28)
<b>R<sup>2</sup></b>	0.2141	0.3899	0.0975	0.1055	0.0281
<b>AdjR<sup>2</sup></b>					
<b>F</b>	0.1806	0.3735	0.0586	0.0833	0.0210
<b>P&gt;F</b>	9.1013 0.0000	23.7751 0.0000	2.5072 0.0340	4.7624 0.0004	3.9728 0.0014

Notes: the figures in parentheses are the T-statistics of variables. \*, \*\* and \*\*\* means the significant level at 10%, 5% and 1%, respectively. The descriptions of those abbreviations are stated in the table 1. Considering the table 9, there is also a significantly positive correlation between the Lerner Index and firm performance index, IR. Similar with the results stated in table 8, all regression coefficient of Lerner Index in this model are at 1% level of significance. It is obvious that the results in this paper is support the arguments of structure-conduct-performance hypothesis and competition-fragility hypothesis. The banking industry of emerging market countries is nascent and incomplete. The less competitive market condition and control and guide from the government can help the banking system development and improvement. Therefore, in this stage, the relationship between bank competition and performance of emerging markets is in keeping with the competition-fragility hypothesis. A higher concentration market will reduce the market risk and beneficial to the bank stability. In accordance with the previous analysis and empirical studies, this paper argues that the bank competition will has adverse impact on the bank performance.

**Table 9 Regression result with dependent variable IR**

	<b>CHINA</b>	<b>INDIA</b>	<b>BRAZIL</b>	<b>RUSSIA</b>	<b>TOTAL</b>
<b>Intercept</b>	-4.1261*** (-19.94)	-4.0086*** (-15.97)	-2.4692*** (-11.24)	-2.6476*** (-11.31)	-2.0282*** (-14.97)
<b>LERNER</b>	0.8147*** (3.67)	2.9072*** (9.68)	2.3249*** (8.96)	0.1433*** (4.23)	0.6069*** (3.62)
<b>LOANS</b>	0.2354 (1.21)	0.3851 (1.35)	0.6145 (1.37)	0.3911 (1.46)	0.0820 (0.47)
<b>DEPOSIT</b>	0.2642 (1.61)	0.0950 (0.70)	0.8785*** (5.86)	0.2721** (1.99)	-0.3645*** (-4.48)
<b>SIZE</b>	0.9954*** (136.29)	0.9428*** (62.13)	0.9006*** (64.34)	0.9557*** (72.40)	0.9341*** (131.39)
<b>GDP</b>	-0.0073 (-1.07)	-0.0255** (-2.29)	-0.0119 (-0.85)	-0.0115* (-1.78)	-0.0433*** (-8.41)

$R^2$	0.9927	0.9625	0.9799	0.9652	0.9650
Adj $R^2$	0.9925	0.9614	0.9791	0.9643	0.9648
F	4532.627	948.6905	1126.014	1120.581	3786.663
P>F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: the figures in parentheses are the T-statistics of variables. \*, \*\* and \*\*\* means the significant level at 10%, 5% and 1%, respectively. The descriptions of those abbreviations are stated in the table 1.

In addition to this, these two tables also show that the DEPOSITS has adverse impact on the ROA while it has positive effect on the IR. And the bank size is clearly positively associated with the bank performance. It is because bank with larger size may have greater competition ability in the market and then obtain better performance. For other two control variables, the results are not achieving an agreement and most of them are not pass the significant test. Moreover, the  $R^2$  and Adj $R^2$  in table 9 is obviously higher than these in table 8. It implies that when using IR as the performance measure, the model is fitting well better than apply ROA as performance indicator.

### Robustness Test

In order to examine whether the final results will change when the measurement of variables changed, this paper run a robustness test on the main model. A new performance measure will be used to replace original two indicators to investigate the model. In this part, the return on equity (ROE) as another frequently used performance index is adopted. The result of the robustness test declares the same outcome with the previous findings. It confirms that there is a negative association exists between bank competition and its performance.

### Conclusion

In conclusion, in order to investigate the bank competitive condition, and how does it influence the bank performance in emerging market countries, this paper select data from the period 2000 to 2014 to find the results. The sample of financial data of four emerging countries (Brazil, Russia, India and China) is selected from the BankScope database. After removing the useless and incomplete data, there are 692 sets of observation have been tested by both Panzar-Rosse approach and the regression model based on previous studies.

In the first step, the results from Panzar-Rosse method manifests that the H-statistics of Brazil, Russia and China is lies between 0 and 1. The bank markets in these three countries are in the monopolistic competition. Nevertheless, the H-statistic of India is 0 through the calculation and Wald test. This implies that the India bank system experiences the monopoly during these years. In addition to this, this paper also applies Lerner Index to measure the bank competition. From the above tables, both H-statistics and Lerner Index provide similar results about the competitive condition among these four countries. Russia has highest level of bank competition than other three countries and India has the lowest degree of competition. Furthermore, the main model adopts Lerner Index to test the effects of bank competition on the performance. Both table 8 and table 9 display same results that the Lerner Index is positively related to the bank performance measures. In other words, the bank competition will has adverse impact on the bank performance. According to these results, both of the hypotheses put forwarded in the above section have been proved.

There is also exists some deficiencies in this paper. They are expected to be improved in the further research. Firstly, the regression model tests the data over 2000 to 2014 which include the years in financial crisis. The data in financial crisis may affect the accuracy of the results, but this paper does not consider this effects. Secondly, the sample size of the paper is not large enough, especially for the India. This may also influence the final results. In further study, we can collect more data and test them in different time period to achieve more accurate results.

With the global economic development, the new banks and foreign banks are gradually entering the market. The competition in emerging bank market will become intense. In order to eliminate the adverse impact results from the fierce competition, these countries can continue to promote the reform of the commercial bank system and improve the micro-foundation of the banking industry. Improving the management level of the bank and the efficiency of operation, so as to improve the performance of the bank market. Meanwhile, government regulation is also important. Rational supervision may decrease the operation risk of banks, and provide great external environment to avoid vicious competition. Then, build a better banking market.

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