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Abstract

This paper presents empirical assessments of the competitiveness of the banking industry in China during 1985-2001. Since asset concentration in China's banking industry does not seem to be decreasing, and since it has long been believed that banking industry concentration impairs competitiveness, it is worthwhile to assess the state of competition there. In this paper, we use the Panzar-Rosse method in various ways in order to ensure the robustness of the results. The conclusion is that the banking system in China was already near a state of perfect competition before foreign banks began to enter China's financial market.

JEL classification: G21; L1; D41

Keywords: China, banking, competition, Panzar-Rosse, panel data

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1. Introduction

After the financial reform of 1994, China's financial system changed dramatically. Three state policy banks—the Export Import Bank of China, National Development Bank and Agricultural Development Bank of China—were established, while the four biggest state-owned commercial banks—the Industrial and Commercial Bank of China, Agricultural Bank of China, Construction Bank of China and Bank of China—were encouraged to become independent commercial banks. By the end of 1996, 17 new banks were established, including the Bank of Communications, CITIC Industrial Bank, and China Merchants Bank, with different characteristics from the four largest banks. Their business area is not restricted by the state, and they can operate fairly freely. Since China became a Member State of the WTO in 2001, the entry by foreign financial institutions into China has accelerated. Banks now have to be managed efficiently.

The number of banks and the inflow of foreign investment have increased rapidly, and competition in the banking sector has become much more severe over the past several years. It is a common belief that China's banking sector is not very competitive, though to our knowledge there have been no empirical assessments of it.

Recently, many empirical assessments analyzing banking competition have been published. Claessens and Laeven (2003) use the method of Panzar and Rosse (1987) to examine the banking industry in 50 countries, and conclude that nearly all countries have monopolistic competition. The competition in Brazil, Mexico and UK is much higher than in the U.S. Shaffer and Disalvo (1994) find that Pennsylvania in the U.S. has duopoly market conditions, but that the degree of banking industry competition is still high. Murjan and Ruza (2002) assess the Arab Middle Eastern banking markets, and Gelos and Roldos (2002) examine the banking industry in eight countries in Latin America and Europe. All these surveys use the Panzar and Rosse model, and find that the banking industries in almost all countries are in a state of monopolistic competition.

The aim of this paper is to analyze the degree of competition of the banking industry in China before its affiliation with the WTO, using a rigidly statistical technique, i.e., the method of Panzar and Rosse. Generally speaking, the banking system in China is close to perfect competition, and the degree of competition is

considerably higher than in other countries. Looking at individual years, 1996, 1997, 1999 and 2000 are found to feature perfect competition and 1998 to have monopolistic competition, with the data indicating a very high degree of competition. The four largest banks in China over 1985-2001 were in a state of monopolistic competition. On the other hand, it is surprising that, from 1996 to 2000, the competition among small-scale banks was perfect. We checked the robustness of these results using some dummy variables, but they were hardly affected. This implies that, before China acceded to the WTO in 2001, its banking system was already quite competitive. From the results above, it is found that opening the Chinese banking market to foreign institutions will not promote further competition, though it will have effects on firms' financing.

This paper is organized as follows. Section 2 introduces the Panzar-Rosse method as described in Nathan and Neave (1989) and previous studies . Section 3 presents the situation of the Chinese banking system and the characteristic of the data. Section 4 provides the empirical analysis. Section 5 draws conclusions.

2. The Panzar-Rosse Method in Nathan and Neave (1989) and Previous Studies

2.1 The Panzar-Rosse method in Nathan and Neave (1989)

The Panzar-Rosse method is used to estimate the degree of competitiveness. The estimation is relatively to perform because there few assumptions need to be made. Furthermore, the Panzar-Rosse method is used widely, so it can be used to compare the results for the Chinese banking industry with those of other countries.

As the Panzar-Rosse method in Nathan and Neave (1989) will be used to estimate banking in China in this paper, that method will be introduced in this section.

Loan losses are considered to be an important element in the income of banks in Nathan and Neave (1989). Therefore, TRLL (total revenue less provision of loan losses) is a dependent variable that can be explained using interest rate and other expenses as independent variables. The Panzar-Rosse model specified by Nathan and Neave (1989) is as follows:

$$\ln TRLL_i = a + b(\ln PF_i) + c(\ln PKB_i) + d(\ln PL_i) + e(\ln AST_i) + f(\ln BR_i) + gD6_i \quad , \tag{1}$$

where

TRLL=total revenue less provision for loan losses

PF=interest expenses/total deposits（unit price of funds）

PKB=premises expenditure/number of branches（unit price of capital）

PL=wages and salary expenses/number of employees（unit price of labour）

AST=total assets

BR=number of branches/total number of branches in the system

$$D6=\begin{cases}1 & \text{for the six largest banks}\\ 0 & \text{for other banks}\end{cases}$$

here, they define H=b+c+d. Panzar-Rosse shows that,

$$H\begin{cases}\leq 0 & \text{monopoly}\\ \in(0,1) & \text{monopolistic competition}\\ =1 & \text{perfect competition}\end{cases}$$

PF, PKB, and PL, are prices of input factors, and AST, BR, and D6 are proxies for other variables that have an effect on equilibrium revenue. In Nathan and Neave (1989), a regression without loan losses and a regression where loan losses are used as input price variables are both estimated. The results from both are quite similar.

Incidentally, Gunji and Yuan (2004) find that the H-statistic becomes greater than unity if firms with increasing-return-to-scale technology choose a saddle point under certain conditions. However, a value greater than unity is not actually observed.

2.2 Previous studies

There are many studies on the competitiveness of banking systems using the Panzar-Rosse method, as shown in Table 1. Banks, trust companies, and mortgage companies in Canada are assessed using the Panzar-Rosse method in Nathan and Neave (1989). The result is that the hypothesis of monopoly is rejected in all cases, and perfect competition is accepted in some cases. These results are the same as Shaffer (1993). Furthermore, they conclude that banks are much more competitive than trust companies and mortgage companies in Canada. Nathan and Neave (1989) hypothesize that international business,

which is conducted in a highly competitive market, makes up a significant fraction of bank business, but that trust companies and mortgage companies are only engaged in the domestic market.

Niimi (1998) estimates the banking industry in Japan during the peak of the bubble (1989.3-1991.3) and the period near the bubble's end (1994.3-1996.3). Competition in banking in Japan is found to be monopolistic during the peak of the bubble. Then during the period near the bubble's end, it is monopolistic competition.

There are also many studies that examine the banking industry in Europe, such as Molyneux et al. (1994), who estimate the banking industry in Germany, UK, France, Italy, and Spain using the Panzar-Rosse model. They find that the banking industry in Italy is a monopoly and that the others are in monopolistic competition. Bikker and Haaf (2002) assess the banking industry in 17 European countries and six countries that are outside of Europe. They conclude that all the countries have nearly monopolistic competition. They also find that the environment for big banks is much more competitive than that for small banks, and also that the environment in the international market is much more competitive than in the local market.

There are also a number of assessments of banking industries in developing countries. Claessens and Laeven (2003) estimate the banking industry in 50 countries using the Panzar-Rosse method. They conclude that nearly all countries are in monopolistic competition. Eight countries in Europe and South America, all of which have gone through some process of consolidation, are estimated in Gelos and Roldos (2002). Argentina and Hungary are found to be in nearly perfect competition. Furthermore, they conclude that even when the degree of concentration is high, the degree of competition is not decreased. In this paper, we find the same result for China. Murjan and Ruza (2002) assess the countries in the Arab Middle East from 1993 to 1997 and obtain a result of monopolistic competition. They also find that oil-producing countries are less competitive than non-oil-producing countries.

From the above, the significant observation is made that banking industries in almost all countries are in monopolistic competition. However, the banking industry in China has not been investigated before.

3. The Banking Industry in China

3.1 The situation of the banking industry in China

The banking system in China includes the People's Bank of China, the state policy banks, the state-owned commercial banks, and other commercial banks. The state-owned commercial banks include the Industrial and Commercial Bank of China, Agricultural Bank of China, Construction Bank of China, and Bank of China. By the end of 2001, 70% of the total assets of the banking industry were held by the four largest state-owned banks. CITIC Industrial Bank, China Everbright Banking Co., Ltd, China Minsheng Bank Corp., Ltd, China Huaxia Bank, China Merchants Bank, Bank of Communications, Guang Dong Development Bank, Fujian Industrial Bank, ShenZhen Development Bank Co., Ltd, and Yantai House Saving Bank are other commercial banks. Table 2 provides a classification of banks in China.

The State Policy Banks operate with the aim of accomplishing the state's policy for industrial or regional development, and not principally for posting large profits. Therefore, the People's Bank of China, which is the central bank, and the three state policy banks are not included in our observations. The four largest banks are controlled by the state, and not only are they prevented from dealing with trust investments and equity affairs, but they are also unable to invest in non-bank, non-bank firm and real estate businesses.

3.2. Description of the data

We use data from balance sheets and statements of income reported in China Financial Yearbooks from 1985 to 2002. The China Financial Yearbook is edited by The People's Bank of China and published each November. It records each bank's balance sheet and statement of income for the previous fiscal year.

In the China Financial Yearbook, there are some differences in the content of balance sheets and statements of income among banks. At times, the studied samples do not have the necessary data, so they were deleted. Table 3 shows the summary statistics from 1996 to 2001. For cross-sectional data, 14 or 15 banks were studied as samples. For panel data, there are 71 observations for all banks during 1997-2000, 35 and 26 observations for the four largest banks during 1985-1993 and during 1995-2001, and 52 observations for small banks during 1996-2000.

Following the interpretation in Bikker and Haaf (2002), the H-statistic ranges between 0 and 1, and a large value indicates greater competitive than a small

value. If the revenue equations, demand elasticity, and quantity of banks are the same in the various markets, the H-statistic can be used to make comparisons by country and size of banks. Thus, in this paper we assume that the H-statistic is between 0 and 1, and that a larger H-statistic indicates a higher degree of competition.

4. Empirical Analysis

4.1 Competition Test

In this paper, we analyze competition if the banking industry in China using the following equation:

$$\ln TR_i = a + b\ln EI_i + c\ln BE_i + d\ln PKL_i + e\ln AST_i + \varepsilon_i, \qquad (2)$$

where

TR=Operating revenue

Under the accounting standards of China, revenues from loans, security transactions, and exchange trades are included in operating revenue. Other sources of operating revenue are interest revenue, inter-bank transaction revenue, and revenue from other charges.

In Nathan and Neave (1989), TRLL (gross revenue less provision for loan losses) is used as a dependent variable. They also estimate the regression when the gross revenue is used as a dependent variable. They find that there is no significant difference between the two regressions. On the other hand, gross revenue is used as a dependent variable in Shaffer and DiSalvo (1994). In this paper, operating revenue is used as a dependent variable, and for comparison, interest revenue is also used as a dependent variable in the estimation.

EI=(expense of interest rate + expense of inter-bank transfers) / total assets

This is the expense for the interest rate and expense for inter-bank transfers per asset. This variable is considered to be the price for borrowing funds. Banks are considered to be firms that produce loans and investment. Deposits and funds are regarded as inputs. In this paper, expenses for the interest rate plus expenses for inter-bank transfers are considered to be expenses of interest. In accordance with the accounting standards of banking in China, interest costs represent the

expenditures when raising funds, including expenses for interest on deposits, interest on bonds, interest expenses for other credits, and the cost of borrowing from foreign countries. Expenses for inter-bank are expenditures when transactions are carried out with other financial firms. Furthermore, the cost of borrowing from the central bank, interest cost of inter-bank deposits, interest cost of foreign inter-bank deposits and expenditures for deposits of other finance firms are included.

BE=(service charges + other operating costs) / total assets

This represents service charges and other operating costs per asset. Based on the accounting standards of China, service charges represent the cost for all types of consignment. Other operating costs are those that are not directly related with business, including extra-ordinary losses and amortization on deferred assets, as well as those that are not related with the normal businesses of bank.

PKL= operating costs / total assets

This represents operating costs per asset. In Nathan and Neave (1989), wages and salaries per unit are included as independent variables. Data on wages and salaries for banking in China are not available, so operating costs are used instead. Based on the accounting standards of banking in China, wages and salaries are included in operating costs, and if the data on wages and salaries become available, the estimation should be much more correct.

AST= total assets

Total assets are used as a variable for identifying economy of scale. They are included in the regression, as it is in Nathan and Neave (1989), and Claessens and Laeven (2003).

Here, the H-statistic is H=b+c+d. In order to test the hypothesis of H=1 or H=0, the F-test is used.

Moreover, as a method to investigate the effect of scale, a dummy variable is used. First, we will estimate the regression including as a dummy variable the four biggest banks (DL) in this paper, as equation (3). For the four largest banks, DL=1, and for others, DL=0. We then estimate a regression using as a dummy variable banks that are operated over the whole country (DA), as equation (4). For banks that operate over the whole country, DA =1, and for others, DA=0.

$$\ln TR_i = a + b\ln EI_i + c\ln BE_i + d\ln PKL_i + e\ln AST_i + fDL_i + \varepsilon_i . \quad (3)$$

$$\ln TR_i = a + b\ln EI_i + c\ln BE_i + d\ln PKL_i + e\ln AST_i + gDA_i + \varepsilon_i \quad (4)$$

4.2 Equilibrium test

From Shaffer (1982), we estimate ROA as a dependent variable and define the equilibrium E statistic as the sum of the parameters. The reason for this is that if the market is in equilibrium, a dependent variable will have no correlation with prices of input factors. The same goes for estimating the ROE (revenue on equity) as a dependent variable. Both are in equilibrium when E=0, and in disequilibrium when $E \neq 0$. Since the assumption of the Panzar-Rosse model is long-run equilibrium, we will test whether the banking industry market in China is in equilibrium or not. The following equation is regressed:

$$\ln ROA_i = a + b\ln EI_i + c\ln BE_i + d\ln PKL_i + e\ln AST_i + \varepsilon_i \quad , \quad (5)$$

where, ROA is the ratio of total revenue to total assets before tax. In this paper, E=b+c+d. We use a F-test to examine whether E=0 or not. Table 4 is the result of equation (5).

2001 shows a significant difference from E=0 at the 10 percent level ($p<0.1$). This indicates that the banking industry market is not in equilibrium in 2001. For the equilibrium hypothesis of Panzar-Rosse, we have to exclude the data of 2001.

4.3 The data for each year

In order to estimate changes taking place in the banking industry of China in each year from 1996 to 2000, we use the data of each year, applying the Panzar-Rosse model.

Table 5 shows the results of the H-statistic without the dummy of the four largest banks. The H-statistics are 0.860 and 0.903 in 1996 and 1997. From the F-test, H=1 cannot be rejected and H=0 is rejected. Therefore, we obtain the result that the banking industry market of China in 1996 and in 1997 was in a state of perfect competition. For 1998, the H-statistic is 0.779, but the F-tests for H=0 and H=1 are both rejected at the 10% level. This means that the H-statistic is between 1 and 0, so the banking industry market was in a state of monopolistic competition, though the degree was quite high. Since the H-statistics for 1999 and

2000 are 0.868 and 0.946, the hypothesis H=1 cannot be rejected by the F-test at the 10% level. Therefore, it can be concluded that competition in the banking industry was perfect in those two years.

Although 1998 shows monopolistic competition, the degree of competition is high, so we think there are no essential differences between 1996, 1997, 1998, 1999, and 2000.

In order to estimate the effect of the four largest banks, in equation (3) we add DL into the regression. The results are shown in Table 6.

From 1996 to 2000, the H-statistics are 0.874, 0.997, 0.842, 0.862, and 0.960 respectively. The hypothesis of H=1 cannot be rejected by the F-test at the 10% level in each year, indicating a state of perfect competition. In comparison with Table 5, there are no significant distinctions. Since the parameter of the dummy is not large and the t-value is also not large, the effect of DL is small. This is also shown in Nathan and Neave (1989), where the dummy for large banks has little effect on the estimation.

4.4 The estimation of interest revenue as dependent variable

In Molyneux et al. (1994), interest revenue is important in banks' revenue, so the ratio of interest revenue to total revenue is a dependent variable. In order to find whether operating revenue or interest revenue is better as a dependent variable, when applying the Panzar-Rosse model in the Chinese banking industry, a regression with the interest revenue as a dependent variable is also estimated.

$$\ln TIR_i = a + b\ln PF_i + c\ln BE_i + d\ln PKL_i + e\ln AST_i + \varepsilon_i, \quad (6)$$

Here, H=b+c+d and table 7 is the result of equation (6).

To analyze the effect of DL and DA, when interest revenue is a dependent variable, we estimate equation (7) and (8).

$$\ln TIR_i = a + b\ln EI_i + c\ln BE_i + d\ln PKL_i + e\ln AST_i + fDL_i + \varepsilon_i, \quad (7)$$

$$\ln TIR_i = a + b\ln EI_i + c\ln BE_i + d\ln PKL_i + e\ln AST_i + gDA_i + \varepsilon_i \quad (8)$$

Table 8 shows the results of equation (7). Clearly, when applying the Panzar-Rosse model to the Chinese banking industry, it is better to use operating revenue as a dependent variable.

4.5 Pooled panel data

In order to test competition in the long run, we pooled the panel data from 1996 to 2000. The results are shown in Table 9. Perfect competition cannot be rejected in any case except when operating revenue is a dependent variable and there is no DL. It can be surmised that during those five years, competition in the banking industry in China was close to perfect competition. In developing countries such as Argentina, Brazil, Mexico from 1994 to 2001, using gross interest revenue as a dependent variable, the H-statistics are 0.71, 0.92, and 0.91 respectively. When total revenue is a dependent variable, the H-statistics are 0.62, 0.79, and 0.73 respectively。On the other hand, the H-statistics of developed countries, such as the USA, UK, and Japan from 1994 to 2001, using gross interest revenue as a dependent variable, are 0.15, 0.60, and 0.53 respectively, and when operating revenue is a dependent variable, the H-statistics are 0.47, 0.78, and 0.53 respectively.[1] Compared with the developed countries, the degree of competition in the banking industry of developing countries is very high.

4.6 Fixed effects model

Pooled panel data cannot describe the effect of each bank on competition. In this paper, we add the dummy for each bank, to estimate the H-statistic. Table 10 shows the results.

When operating revenue is used as a dependent variable, the H-statistic is 0.922. Since H=1 cannot be rejected by the F-test, the competition is perfect. When interest revenue is used as a dependent variable, the t-value is not significant. It is obvious that using operating revenue as a dependent variable is better.

4.7 A model with an area dummy

From Table 2, it can be seen that there are banks which operate over the whole country (e.g., Construction Bank, Bank of China) and banks which operate in local areas (such as Guang Dong Developing Bank and Shanghai Bank). To estimate the effect of banks operating over the whole country versus operating in local areas, we add DA to the regression. Banks that operate over the whole country are given a value of unity, and those that operate in a local market a

[1] See Claessens and Laeven (2003).

value of zero. From the results in table 11, we see that the parameter DA is very small and the t-value is not significant. It is clear from this that DA has little effect. The H-statistics show that the degree of competition is monopolistic competition but that the degree is very high.

4.8 The test for the four largest banks from 1985 to 2001

The total assets of the four largest banks make up 70% of total banking industry assets in China. In order to estimate the competition facing the four largest banks in the long run, panel data on them is pooled to compute the H-statistics. Since there was a financial reform in China in 1994, we estimate the H-statistics separately from1985-1993 and from 1995-2001.

First, we test whether the market is in equilibrium or not. Table 12 shows the results of the equilibrium test. E=-0.365 but the P-value is 0.121, so E=0 cannot be rejected. Thus, the market of the four largest banks from 1985 to 2001 was in equilibrium.

From the results in Table 13, we see that the competition in the two periods was monopolistic competition, and that the degree of competition from 1985-1993 was higher than from 1995-2001. It seems that the financial reform in 1994 provided greater protection from competition to the four largest banks. This may be the reason why the bad loans of the four largest banks failed to decrease.

4.9 Test for competition from 1996 to 2000 among small banks

Bikker and Haaf (2002) explain that large banks operate businesses on an international scale and compete with others in the international market, so they are much more competitive than small banks which operate in a local market. In order to compare the degree of the competition between large banks and small banks, the competition of small banks is also estimated. From Table 14, it is clear that the competition among small banks is so high that it is perfect competition. This is not consistent with the results of Bikker and Haaf (2002). We believe the reason for this is that the small banks in China are newer, and are busy studying the managerial experience of international banks, and in addition they are not protected by the State.

5. Conclusion

In this paper, we have used the Panzar-Rosse method to assess competition in

the banking industry in China from 1985 to 2001 in various ways. The Chinese banking system as a whole is in a state of near perfect competition, with a higher degree than other countries shown in previous studies. By year, for example, 1996, 1997, 1999 and 2000 featured perfect competition, while 1998 was in monopolistic competition but with a high degree of competition. On the other hand, it is surprising to find that the competition among small banks from 1996 to 2000 was perfect. Since the dummy variables for the four largest banks and for banks that operate over the whole country have little effect on the estimation, we believe the results are robust. From these results, we can surmise that before its accession to the WTO, China's banking industry already had the characteristics of competitiveness. It seems that opening the Chinese banking market to foreign firms will not promote further competition in China, though it might have effects on firms' financing.

However, there are some problems in this paper, such as the fact that data on wages and salaries, and long time series data are not available. If these problems can be solved, the competitiveness of the Chinese banking industry could be estimated much more correctly. It would also be meaningful to test the competitiveness after China's accession to the WTO (after 2001), and the competitiveness of other developing countries.

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Table 1.

Banking Industry Competition by the Panzar-Rosse Method in Other Studies

Author(s)	Period	Studied Countries	Results
Nathan and Neave (1989)	1982-1984	Canada	1982 is perfect competition. 1983, 1984 are monopolistic competition.
Shaffer and Disalvo (1994)	1970-1986	Pennsylvania (USA)	Duopoly but high degree of competitiveness.
Molyneux et al. (1994)	1986-1989	Germany, the UK, France and Spain	Germany, the UK, France and Spain are near monopolistic competition. Italy is monopoly.
Bikker and Groeneveld (2000)	1989-1996	15 countries in Europe	Almost all countries are near monopolistic competition. But competition in Ireland and Denmark are lower.
Gelos and Roldos (2002)	1994-2000	European and Latin American countries (8 countries)	Argentina and Hungary are near perfect competition. Others are monopolistic competition.
Murjan and Ruza (2002)	1993-1997	Arab Middle East	Monopolistic competition. Oil-producing countries are less competitive than non-oil countries.
Bikker and Haaf (2002)	1988－1998	23 countries	Almost all countries are monopolistic competition, but perfect competition cannot be rejected in some case. Competition of large banks is stronger than the small banks.
Claessens and Laeven (2003)	1994-2001	50 countries	The competition of Brazil, Greece, Mexico are high, but the degree of USA, Japan, Norway, Turkey are lower.
De Bandt and Davis (2000)	1992-1996	4 countries	The competition of small banks is lower, especially in France and Germany.
Niimi (1998)	1989-1991, 1994-1996	Japan	1989-1991 is monopoly. 1994-1996 is monopolistic competition.

Note: This table is based on Bikker and Haaf (2002).

Table 2.

Classification of Banks in China

Type		Name	Listed company	Credit rating
Central bank		The People's Bank of China	—	—
State policy bank		National Development Bank	—	—
		Export Import Bank of China	—	—
		Agricultural Development Bank of China	—	—
State-owned commercial bank		Industrial and Commercial Bank of China	—	**BB+**
		Bank of China	—	**BB+**
		Agricultural Bank of China	—	BBpi
		Construction Bank of China	—	**BB+**
Other comercial banks	National bank	Bank of Communications	—	—
		CITIC Industrial Bank	—	—
		China Everbright Bank	—	Bpi
		China Huaxia Bank	○	Bpi
	Area bank	China Ming Sheng Banking Corp., Ltd.	○	Bpi
		Guang Dong Development Bank	○	CCCpi
		ShenZhen Development Bank Co., Ltd.	○	Bpi
		China Merchants Bank	○	BBpi
		Fujian Industrial Bank	—	—
		Shanghai Pudong Development Bank	○	BBpi
		Shanghai Bank	—	—
		Yantai House Saving Bank	—	—
		Banpu House Saving Bank	—	—
Foreign bank		Foreign bank branches		
Non-bank		Trust investment companies, lease companies, security companies, insurance companies		

Note: The credit rating is from Standard & Poor's in 2003.

Pi is the credit rating based on a portion of open data.

Table 3.

Summary Statistics from 1996 to 2001

1996-2001 (Unit:million yuan)	Maximum	Minimum	Mean	Median	St.Dev.
Operating revenue	79,681,700	4,676	5,049,781	612,294	11,503,445
Interest revenue	17,765,200	3,115	3,405,297	406,461	5,196,175
Expense of interest rate+ Charge of inter bank	72,867,200	2,261	3,605,479	306,226	10,074,744
Service charge + Other operating costs	2,316,700	6	283,924	32,015	592,718
Operating costs	3,832,700	1,246	847,850	126,100	1,240,942
Total asset	404,892,200	67,596	70,254,392	12,974,100	110,427,812

Table 4.

Equilibrium Test for Each Year from 1996 to 2001

lnROA	Number of observations	Constant	lnEI	lnBE	lnPKL	lnAST	E	Adjusted R2
1996	14	-1.065	-1.095	0.533	0.149	-0.178	**-0.413**	0.467
t		-0.314	-2.566	3.565	0.344	-1.917		
							0.500	b
1997	15	-3.444	-1.215	0.296	-0.537	-0.363	**-1.456**	0.482
t		-0.737	-2.201	1.264	-0.800	-2.749		
							0.138	b
1998	14	5.452	-1.124	0.053	1.349	-0.487	**0.277**	0.432
t		1.156	-1.849	0.216	1.839	-3.197		
							0.727	b
1999	13	0.124	-0.792	-0.014	1.161	-0.188	**0.354**	0.649
t		0.052	-2.889	-0.119	2.722	-2.534		
							0.430	b
2000	15	-2.600	-0.070	-0.057	-0.619	-0.387	**-0.747**	0.164
t		-0.378	-0.084	-0.283	-0.652	-2.172		
							0.569	b
2001	14	-28.019	-3.613	-0.153	-2.437	-0.270	**-6.203**	0.350
t		-3.110	-2.966	-0.913	-2.173	-1.983		
							0.016	b

Note: b is the F-statistic when the null hypothesis is H=0.

Table 5.

H-statistic of Each Year When Operating Revenue Is a Dependent Variable

Operating revenue	Number of observations	Constant	lnEI	lnBE	lnPKL	lnAST	**H**		Adjusted R2
1996	14	1.101	0.612	0.099	0.150	0.967	**0.860**		0.999
t		2.493	11.017	5.078	2.648	79.900			
							0.101	a	
							0.000	b	
1997	15	1.155	0.711	0.059	0.133	0.964	**0.903**		0.997
t		1.770	9.217	1.812	1.420	52.331			
							0.460	a	
							0.000	b	
1998	14	0.056	0.675	0.001	0.102	0.993	**0.779**		0.997
t		0.120	11.279	0.049	1.419	66.196			
							0.017	a	
							0.000	b	
1999	14	0.884	0.679	0.033	0.156	0.968	**0.868**		0.996
t		1.407	9.511	1.059	1.371	54.103			
							0.279	a	
							0.000	b	
2000	14	1.220	0.577	0.058	0.311	0.979	**0.946**		0.993
t		1.261	4.682	2.053	2.273	37.606			
							0.767	a	
							0.000	b	

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0.

Table 6.

H-statistic of Each Year with DL When Operating Revenue Is a Dependent Variable

Operating revenue	Number of observations	Constant	lnEI	lnBE	lnPKL	lnAST	DL	**H**	Adjusted R2
1996	14	1.120	0.620	0.098	0.156	0.969	-0.018	**0.874**	0.999
t		2.318	7.584	4.474	2.143	50.914	-0.151		
								0.330	
								0.000	
1997	15	0.870	0.763	0.034	0.200	1.004	-0.231	**0.997**	0.997
t		1.300	8.989	0.925	1.914	28.150	-1.293		
								0.984	a
								0.000	b
1998	14	-0.177	0.722	0.010	0.110	1.023	-0.151	0.842	0.997
t		-0.340	9.485	0.391	1.511	29.774	-0.996		
								0.148	a
								0.000	b
1999	14	0.892	0.677	0.032	0.153	0.965	0.011	**0.862**	0.996
t		1.306	8.069	0.867	1.131	20.863	0.053		
								0.431	a
								0.001	b
2000	14	1.072	0.593	0.059	0.308	0.992	-0.058	**0.960**	0.992
t		0.943	4.218	1.950	2.137	19.560	-0.296		
								0.840	a
								0.001	b

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0
DL is a dummy for the 4 largest banks.

Table 7

H-statistic of Each Year When Interest Revenue Is a Dependent Variable

Interest revenue	Number of observations	Constant	lnEI	lnBE	lnPKL	lnAST	**H**	Adjusted R2
1996	14	0.777	0.257	0.204	0.267	0.968	**0.727**	0.978
t		0.326	0.856	1.944	0.875	14.823		
							0.526	a
							0.112	b
1997	15	-1.777	0.127	0.038	0.276	1.035	**0.440**	0.976
t		-0.954	0.575	0.404	1.030	19.677		
							0.151	a
							0.250	b
1998	14	-1.654	0.631	0.062	0.063	1.078	**0.756**	0.992
t		-1.831	5.417	1.321	0.449	36.938		
							0.133	a
							0.001	b
1999	14	-1.303	0.096	0.069	0.787	1.130	**0.952**	0.994
t		-1.525	0.991	1.640	5.077	46.483		
							0.766	a
							0.000	b
2000	14	-2.074	-0.002	0.092	0.760	1.146	**0.850**	0.987
t		-1.399	-0.013	2.100	3.635	28.762		
							0.592	a
							0.012	b

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0.

Table 8.

H-statistic of Each Year When Interest Revenue Is a Dependent Variable With DL

Interest revenue	Number of observations	Constant	lnEI	lnBE	lnPKL	lnAST	DL	**H**		Adjusted R2
1996	14	0.675	0.208	0.210	0.232	0.956	0.103	**0.650**		0.975
t		0.259	0.472	1.784	0.591	9.309	0.158			
								0.609	a	
								0.352	b	
1997	15	-1.980	0.164	0.020	0.323	1.064	-0.165	0.507		0.974
t		-0.957	0.624	0.173	1.001	9.637	-0.298			
								0.291	a	
								0.278	b	
1998	14	-1.791	0.659	0.067	0.067	1.096	-0.089	**0.793**		0.991
t		-1.679	4.215	1.274	0.452	15.534	-0.286			
								0.337	a	
								0.004	b	
1999	14	-1.356	0.109	0.075	0.809	1.145	-0.071	**0.992**		0.994
t		-1.466	0.959	1.504	4.412	18.277	-0.261			
								0.974	a	
								0.002	b	
2000	14	-2.248	0.016	0.092	0.758	1.161	-0.068	**0.866**		0.986
t		-1.289	0.075	1.989	3.422	14.928	-0.227			
								0.661	a	
								0.019	b	

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0
DL is a dummy for the 4 largest banks.

Table 9.

H-statistic Using Panel Data from 1996 to 2000

	Number of observations	Constant	lnEI	lnBE	lnPKL	lnAST	DL	**H**	Adjusted R2
ln (Operating revenue)	71	0.839	0.681	0.051	0.142	0.976	-	**0.874**	0.997
t		3.781	28.927	4.925	3.953	143.124	-		
								0.002	a
								0.000	b
ln (Interest revenue)	71	-0.417	0.439	0.062	0.383	1.047	-	**0.884**	0.977
t		-0.619	6.131	1.997	3.499	50.552	-		
								0.341	a
								0.000	b
				With dummy					
ln (Operating revenue)	71	0.715	0.710	0.048	0.167	0.997	-0.123	**0.924**	0.997
t		3.191	26.752	4.718	4.519	84.055	-2.124		
								0.101	a
								0.000	b
ln (Interest revenue)	71	-0.410	0.437	0.063	0.381	1.046	0.007	**0.881**	0.977
t		-0.583	5.245	1.968	3.284	28.076	0.039		
								0.407	a
								0.000	b

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0
DL is a dummy for the 4 largest banks.

Table 10.

H-statistic Using Individual Effect Data from 1996 to 2000

	Number of observations	lnEI	lnBE	lnPKL	lnAST	H		Adjusted R2
ln(Operating revenue) t	71	0.744 18.940	0.047 3.581	0.131 2.539	1.010 0.788	**0.922**		0.998
						0.198 0.000	a b	
ln(Interest revenue)	71	0.343 3.403	0.085 2.504	0.247 1.859	0.788 6.668	**0.675**		0.987
						0.038 0.000	a b	

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0.

Table 11.

H-statistic Using Pooled Panel Data with DA from 1996 to 2000

	Number of observations		Constant	lnEI	lnBE	lnPKL	lnAST	DA	H		Adjusted R2
ln(Operating revenue)	71		1.022	0.672	0.054	0.159	0.967	0.053	**0.885**		0.997
		t	3.967	27.648	5.144	4.209	102.642	1.374			
									0.006	a	
									0.000	b	
ln(Interest revenue)	71		0.633	0.387	0.084	0.476	0.995	0.302	**0.946**		0.979
		t	0.841	5.440	2.720	4.319	36.157	2.690			
									0.652	a	
									0.000	b	

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0
DA is the dummy for banks that operate over the whole country.

Table 12.

The Equilibrimum Test of The 4 Largest Banks from 1985 to 2001

Number of observations	Constant	lnEI	lnBE	lnPKL	lnAST	**E**	Adjusted R2
61	10.042	1.036	-0.223	-1.178	-1.000	**-0.365**	0.643
t	2.659	3.452	-1.177	-5.036	-5.881		
						0.121	b

Note: b is the F-statistic when the null hypothesis is H=0.

Table 13.

H-statistic of the 4 Largest Banks from 1985-1993 and the H-statistic of the 4 Largest Banks from 1995 to 2001

	Number of observations	Constant	lnEI	lnBE	lnPKL	lnAST	H		Adjusted R2
ln (Opeating revenue)	35	4.623	0.524	0.080	0.161	0.757	**0.765**		0.977
t		7.766	6.445	1.481	2.757	28.910			
(1985-1993)							0.000	a	
							0.000	b	
ln (Interest revenue)	35	-2.314	2.393	-1.312	-0.726	0.725	**0.354**		0.330
t		-0.395	2.990	-2.458	-1.260	2.809			
(1985-1993)							0.103	a	
							0.363	b	
ln (Operating revenue)	26	2.149	0.727	-0.011	-0.045	0.854	**0.671**		0.945
t		1.498	16.259	-0.437	-0.430	9.094			
(1995-2001)							0.011	a	
							0.000	b	
ln (Interest revenue)	26	11.466	0.172	0.037	-0.013	0.285	**0.196**		0.621
t		8.146	3.916	1.492	-0.130	3.091			
(1995-2001)							0.000	a	
							0.107	b	

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0.

Table 14.

H-statistic of Small Banks from 1996 to 2000

	Number of observations		Constant	lnEI	lnBE	lnPKL	lnAST	H		Adjusted R2
	52		0.923	0.690	0.061	0.197	0.993	**0.947**		0.994
ln (Operating		t	3.644	20.711	5.675	4.551	82.732			
revenue)								0.359	a	
								0.000	b	
	52		-1.012	0.580	0.053	0.262	1.078	**0.896**		0.948
ln (Interest		t	-1.227	5.349	1.533	1.863	27.584			
revenue)								0.578	a	
								0.000	b	

Note: a is the F-statistic when the null hypothesis is H=1
b is the F-statistic when the null hypothesis is H=0.