

Effects of Foreign Banks Entry on Efficiency of Chinese

Commercial Banks

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1 Introduction

China's banking market has been opened completely to foreign banks since 2006. Foreign banks have expanded quickly since China's accession to WTO. By the end of 2010, banks of 14 countries or zones have set up 37 foreign-owned banks(including 223 branches), 2 joint-owned banks(including 6 branches and one subsidiary body) and one foreign-owned finance company. There are 74 foreign banks of 25 countries and zones which set up 90 branches. There are 360 operational institutions totally, almost doubling that of 2004. Total asset of foreign banks in China reaches 1740 billion RMB, twice more than that of 2004 and is 1.85 percent of total asset of financial institutions of Chinese banking sector. The degree of openness of Chinese banking sector have been greatly improved.

Table 1 Asset and operational institutions of foreign banks in China

	2004	2005	2006	2007	2008	2009	2010
Operational institutions	188	207	224	274	311	338	360
Total asset (Billion)	582.3	715.5	927.9	1252.5	1344.8	1349.2	1742.3
Percent of total asset of financial institutions (%)	1.84	1.91	2.11	2.38	2.16	1.71	1.85

Data from: 2010 Annual report of China Banking Regulatory Commission

Foreign banks entry is changing the living conditions and competition environment of Chinese commercial banks and accordingly influencing the performance and efficiency of them. Theoretical analysis and opening experience of some countries showed that foreign bank entry would improve competition of banking sector. Domestic banks have to keep improving technology and management and advancing efficiency in order to keep the market share. However, some research of emerging markets found that foreign bank entry weakened competition of domestic banking sector. In the critical period of complete opening of Chinese banking sector, it is very important to make clear the effect of foreign bank entry on performance and efficiency of Chinese commercial banks so as to boost healthy competition and development.

The second part reviews the relative literature and the third part describes the measuring method of profit efficiency of commercial banks and analyzes the efficiency of some Chinese banks. The fourth part studies the relationship of degree of foreign bank entry and bank efficiency empirically and the final part concludes.

2 Literature Review

What effects foreign entry has on efficiency of domestic commercial banks is an controversial global topic currently. Supporters of financial liberalization state that foreign bank entry will help to improve competition and efficiency of domestic banking sector. However, Sitgltz(1994) pointed out that the potential cost to domestic banks, enterprises and government brought by foreign bank entry will counteract with the

efficiency improvement of domestic banking sector. Some empirical studies showed that the positive and negative effects of foreign bank entry on efficiency of domestic banks existed at the same time.

Claessens et al (2001) investigated the relationship between foreign banks entry and the performance of the domestic banking sector in 80 countries using panel estimations with 7,900 bank observations from 1988 to 1995. They measured the degree of foreign bank entry by amount share and asset share and measured the bank performance by net interest margin, pre-tax profit rate, non-interest income and charge rate, etc. Results showed that in developing countries, foreign banks had higher interest margin, rate of return and taxes than domestic banks. The situation was adverse in developed countries. Their results indicated that higher foreign bank presence was related with lower profitability, costs and margins of domestic banks. Therefore, they thought that foreign bank entry improved the competition and efficiency of domestic banking sector. Some studies of developing countries drew similar conclusions. Yildirim & Philippatos (2007) found that deregulation and opening up of the financial markets of Latin American countries served as an important catalyst to increase the competitiveness of banking markets, thereby cut down the interest margin and improved cost efficiency.

On the contrary, some studies showed that foreign entry had negative effects on the improvement of competition and efficiency of host banking market. The efficiency improvement of foreign bank entry is up to conditions of economy developing, capital market operating and financial development of domestic countries. Hermes & Lensink (2002) studied influence of foreign bank entry on profitability, cost and income of domestic banks of 26 undeveloped countries with model of Claessens et al (2001) and found that foreign bank entry had inverse U-shaped relationship with interest margin and cost. That meant that foreign bank entry would improve competition of domestic banks only at a best scale of foreign bank entry. Uiboupin (2004) sampled 319 banks of transition economy countries of Central and Eastern Europe from 1995 to 2001 and found that foreign bank entry improved competition of domestic banking market remarkably. In the countries where banking markets were undeveloped, the reducing degree of bank income and loan loss reserve was evidently higher than that in countries where banking markets were relatively perfect.

Chinese scholars have already carried out positive explorations on the efficiency of China's commercial banks as well as the influence of foreign banks entry, but has not come to a consistent conclusion. Based on the cross-section data of Chinese banking sector from 1955 to 2004, Ye Xin (2006) made an empirical analysis on the relationship among the extent of the foreign banks entry, market competition structure and Chinese banks' efficiency. The results of this study are as follows: on the one hand, the competitive pressure brought by foreign banks entry is limited and has not broken the inefficient status of the Chinese banking industry; on the other hand, the improvement of market competition will promote the efficiency evolution of local banks stimulated by external competitive pressures. The empirical study of Xiong Zhengde and Hou Lijuan (2009) showed that foreign banks entry had positive effects on the efficiency evolution of Chinese commercial banks. Zhang Jinqing and Wu Youhong (2010) found that there was a threshold effect regarding the effect of foreign bank entry on Chinese commercial banks' efficiency.

Based on international experience, it can be concluded that foreign bank entry is playing an uncertain role in promoting the competitiveness and efficiency of local banking industry. Due to the availability of data concerned, most researches on the efficiency of Chinese commercial banks are limited to state - owned commercial banks and some joint-stock banks while research on city commercial banks is nearly a blank. Moreover, current researches often employ the financial indicators of commercial banks to measure indirectly the effects of foreign bank entry on domestic commercial banks' efficiency. However, relations between foreign bank entry and efficiency are rarely researched directly. Thus, with profit efficiency of commercial banks as the research object, this paper has investigated the influence of foreign banks entry empirically. Besides, foreign banks make their presence in Chinese banking market in the form of branches and foreign corporative banks as well as strategic investors of Chinese state-owned banks, joint-stock banks and city commercial banks. Presently, the study on the introduction of strategic investors is focused on

qualitative analysis while empirical research on the relations between such introduction and the influence on Chinese banks' efficiency remains seldom seen. In this sense, this relation has also been another subject of our research in this paper.

3 Measurement of Chinese commercial banks' profit efficiency

3.1 Stochastic frontier function model

Since the Stochastic Frontier Analysis (SFA) has considered the interference of stochastic error to efficiency, the stochastic frontier varies according to the sample point, which avoids the influence of statistic error on the efficiency. So SFA method is adopted to estimate banks' profit efficiency in this paper.

SFA method divides the error terms of fundamental equations into two parts: the first (V) represents the normally distributed disturbance; second (U) represents truncated distributed (truncated from zero) inefficient terms of an enterprise. Therefore, the total profit (TP) of enterprise n at the period t can be expressed as follows:

$$TP_{nt} = TP(Y_{nt}, I_{nt}) + \varepsilon_{nt} = TP(Y_{nt}, I_{nt}) + V_{nt} - U_{nt} \tag{1}$$

Where, TP represents total profits, Y output vector, I input price vector, and ε error term.

3.2 Model, variables and data

(1) Selection of input price and output vector

A focus of the research on bank efficiency is how to define the input and output items of financial enterprises with multiple products. Since deposit is both an input and output of a bank, Berger and Humphrey (1991) and Bauer et al (1993) have put forward a modified output method, which requires profit equation to take into account the output and input characteristics of deposit. Interest payments of the bank are accounted as input while the total deposit as output. We employ such modified output method in this paper. For detail description of the variables, see Table 2.

Table 2: Variables description of profit equation

Variables	Items	Description
Dependent variable: profit		
TP	Total Profits	Bank net profit after tax
Independent variable: output		
Y1	Loan	Total bank loan
Y2	Investment	Total bank investment
Y3	Deposit	Total bank deposit
Independent variable: input price		
w1	Deposit price	Interest payments/total deposit
w2	Capital price	Non-interest payments/average asset

(2) Specific description of profit equation

The profit equation we have employed is a most widely used translog function. Described as follows:

$$\ln \left(\frac{TP}{w_2 z_1} + \left| \left(\frac{TP}{w_2 z_1} \right)^{\min} \right| + 1 \right) = \delta_0 + \sum_{i=1}^3 \delta_i \ln \left(\frac{y_i}{z_1} \right) + \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 \delta_{ij} \ln \left(\frac{y_i}{z_1} \right) \ln \left(\frac{y_j}{z_1} \right) + \beta_1 \ln \left(\frac{w_1}{w_2} \right) + \frac{1}{2} \beta_{11} \ln \left(\frac{w_1}{w_2} \right) \ln \left(\frac{w_1}{w_2} \right) + \sum_{i=1}^3 \theta_i \ln \left(\frac{y_i}{z_1} \right) \ln \left(\frac{w_1}{w_2} \right) + V_{it} - U_{it} \tag{2}$$

Where, TP represents total profits, Y1, Y2 and Y3 represent output, w1 and w2 are input prices, V_{it} is

error term and U_{it} is inefficient term. In order to meet the linear homogeneity requirement of the model, standardization of the total profit and other input prices are performed on the basis of input price w_2 . In addition, the total profit and all output terms shall be adjusted by the bank's total earning assets (z_1) so as to eliminate effects of different scales on bank efficiency. Since there may be negative profits, dependent

$$\ln \left(\frac{TP}{w_2 z_1} + \left| \left(\frac{TP}{w_2 z_1} \right)^{\min} \right| + 1 \right)$$

variable in the profit equation is expressed as

to avoid meaningless logarithm.

$\left| \left(\frac{TP}{w_2 z_1} \right)^{\min} \right|$ refers to the absolute value of the minimum $\frac{TP}{w_2 z_1}$ value of all banks in the same year. In this

way, for a company with the minimum $\frac{TP}{w_2 z_1}$ value, its dependent variable is $\ln (1) = 0$ during the sample period.

In order to estimate the above-mentioned profit equation and investigate the influence of the foreign banks entry on the efficiency of local banks, we have adopted the Battese & Coelli (1995) model. Based on panel data, this model makes it more convenient for us to observe and study the efficiency changes of Chinese banks over time on the one hand, and on the other hand it helps to examine the impact of market entry and share-holding of foreign banks on the efficiency of Chinese banks while estimating such efficiency.

The Battese & Coelli (1995) model assumes that the inefficient term U_{it} obeys the truncated distribution $N(m_{it}, \sigma_u^2)$ and $m_{it} = z_{it} \delta$. Where, z_{it} is a vector affecting the Chinese banks' efficiency. Here we mainly select the variables representing the extent of the foreign banks entrance; δ is a parameter to be estimated. Besides, in the model of Battese & Corra (1977), the estimates of variance by V_{it} (the error term) and U_{it} (the inefficient term) are replaced by γ and σ^2 separately. The formulations are:

$\sigma^2 = \sigma_v^2 + \sigma_u^2$ and $\gamma = \frac{\sigma_u^2}{\sigma^2}$. Where, the variation rate $\gamma \in (0, 1)$ represents the practical meaning of inefficient factors in model analysis.

(3) Selection of variables of efficiency influencing factors

Since the aim of this study is to investigate the influence of the foreign bank entry on the efficiency of Chinese commercial banks, we have selected foreign banks' assets share representing the extent of foreign bank entry, which has been widely used in related literatures and articles. Besides, we would like to examine changes of banks efficiency after the introduction of foreign strategic investors. Dummy variables shall be used to represent the share-holding status of foreign banks. And the average value of inefficient terms m_{it} can be expressed by the following formulation:

$$m_{it} = \delta_0 + \delta_1 FASSET + \delta_2 FASSET^2 + \delta_3 ACQUIRE + \delta_4 TREND \tag{3}$$

Where, FASSET represents a foreign bank's asset share and is equal to the ratio of a foreign bank's total assets against that of all Chinese banking institutions; ACQUIRE is a dummy variable representing the share-holding status of a foreign bank. During the sample period, if a foreign bank holds any percent of shares a Chinese bank, it will be represented by the Arabic number 1 and if not by 0. TREND refers to the

time trend.

When studying the competition effect of foreign bank entry, we have found that the relationship between the extent of foreign bank entry and the competitiveness of Chinese banking industry is nonlinear and U-shaped. Thanks to the close relationship between competition and efficiency, we have added quadratic term to investigate the relationship between foreign bank entry and local banks' efficiency.

(4) Sample data

We have selected the data of 20 banks in total as a sample, including four state-owned commercial banks like ICBC (Industrial and Commercial Bank of China), ten joint-stock banks like Bank of Communications and six city commercial banks such as Bank of Shanghai.

Due to the unavailability of early data of city commercial banks, the sample period we have selected is from 1999 to 2009, during which data of all the 20 banks are complete and available. So our sample data is balanced panel data. There are 220 observed value in the sample. And these sample data are derived from Bankscope database and Almanac of China's Finance and Banking (2000-2010).

3.3 Profit efficiency of Chinese commercial banks

The software employed in this paper is Frontier4.1 which is written on the basis of Battese & Coelli (1988, 1992 and 1995) model.

Profit efficiencies of Chinese state-owned commercial banks, joint-stock banks and city commercial banks in the sample are classified and summarized (see Table 3). The data shows that city commercial banks enjoy the highest profit efficiency and profit efficiencies of state-owned banks and joint-stock banks are approximate.

Table 3: Classification and summary of the efficiency of Chinese banking industry

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
State-owned banks	0.66	0.64	0.66	0.68	0.77	0.79	0.78	0.77	0.83	0.83	0.87	0.75
Joint-stock banks	0.69	0.69	0.70	0.72	0.74	0.74	0.79	0.78	0.79	0.79	0.84	0.75
City commercial banks	0.74	0.75	0.72	0.69	0.71	0.73	0.78	0.78	0.84	0.84	0.86	0.77
Average	0.70	0.70	0.70	0.70	0.74	0.75	0.79	0.78	0.81	0.81	0.85	0.76

Data source: derived from data of Bankscope database and Almanac of China's Finance and Banking (2000-2010) calculated by Frontier 4.1.

Judging from the profit efficiency changes of Chinese state-owned commercial banks, joint-stock banks and city commercial banks from 1999 to 2009, it can be concluded that the profit efficiency of Chinese banking sector is generally increasing with fluctuations. During this period, efficiency of Chinese state-owned commercial banks, joint-stock banks and city commercial banks took the lead alternately. Profit efficiency of state-owned banks rose faster relatively.

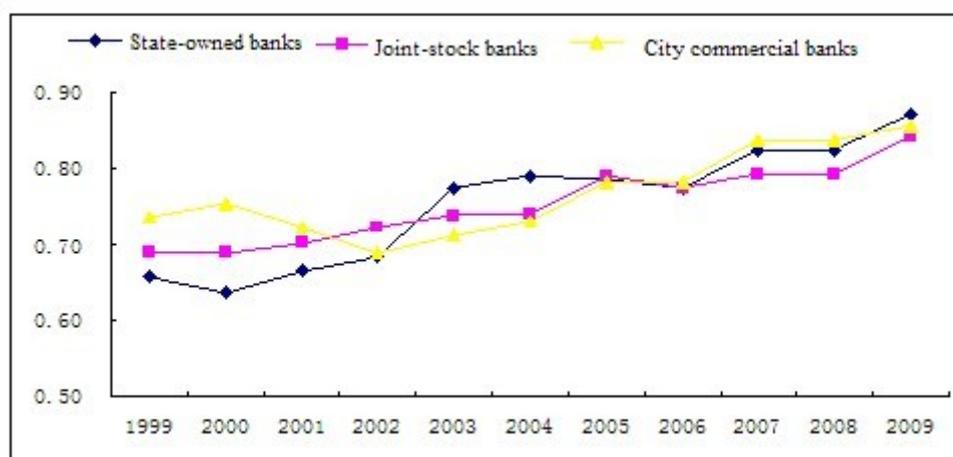


Figure 1: Changes of profit efficiency of Chinese banking industry

4 The influence of foreign bank entry on the efficiency of Chinese commercial banks

According to the estimated results of the profit equation, the log likelihood function and the LR test of the one-sided error show that the function is generally acceptable. The estimation of the variation rate γ shows that inefficient terms in profit function will exert significant impact¹.

According to the estimated results of the profit equation, the coefficient of linear term of the variables representing the extent of foreign bank entry is negative and the coefficient of quadratic term is positive, which indicates that there is a U-shaped relationship between the extent of foreign bank entry and efficiency of Chinese commercial banks. During the preliminary stage of foreign bank entry, efficiency of Chinese commercial banks first declines and begins to rise when market share of foreign banks reaches a certain level.

This suggests that during the initial period, domestic banks begin to invest heavily in advanced technology due to competitive pressure, as a result of which cost increases and profitability declines. With the increasingly application of advanced concepts and technology of foreign banks, technology and management of domestic banks is improved. Positive effects of foreign bank entry start to appear and grow, exceed early negative effects and improved the efficiency of Chinese banks in the end. But currently market shares of foreign banks are quite small and their impact on Chinese commercial banks is not that significant yet.

Dummy variable representing shareholding of foreign banks is positively but not significantly related with profit efficiency. This suggests that the introduction of foreign strategic investors may help Chinese commercial banks to optimize their property right structures, improve their corporate governance structures, and upgrade the innovation capacity in service and products accordingly. However, it will take time for the spillover effects of shareholding by foreign banks to work.

5 Conclusion

Based on SPA method, this paper has made empirical analysis on profit efficiency of Chinese state-owned commercial banks, joint-stock banks and city commercial banks, and investigated the influence of foreign bank entry on the efficiency of Chinese commercial banks from the perspectives of market entry and shareholding in Chinese commercial banks. The conclusions are shown as follows:

1. The extent of foreign bank entry represented by asset share of foreign banks has the U-shaped relationship with profit efficiency of Chinese commercial banks. That is to say, in the preliminary stage, profit efficiency of domestic banks will not rise significantly but even declines, and then begin to rise when

¹ Because of space limitation, estimated results of the function are omitted.

market share of foreign banks reaches a certain level.

2. Dummy variable representing shareholding of foreign banks is positively but not significantly related with profit efficiency. This suggests that introduction of foreign strategic investors has a positive effect on the promotion of profit efficiency of Chinese commercial banks. However, it will take time for the spillover effects of shareholding by foreign banks to work.

3. The data shows that city commercial banks enjoy the highest profit efficiency and profit efficiencies of state-owned banks and joint-stock banks are approximate. Profit efficiency of Chinese banking sector is generally increasing with that of state-owned banks rising comparatively faster.

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ABSTRACT

Based on the estimation of profit efficiency for 20 major commercial banks in China by the method of Stochastic Frontier Analysis(SFA) for 1999-2009, this paper studied the impact of foreign banks entry by market entry and shareholding on the efficiency of domestic banks. Results show U-shaped relationship between the efficiency of domestic banks and market share of foreign banks, that is, the efficiency does not increase significantly in the early stage of foreign bank entry, even falls to some extent, and begins rising when foreign banks' market share expand to a certain level. Share-holding of foreign banks to domestic banks has positive effects on the bank efficiency.

RESUME

Ms. Li Wei was born in Inner Mongolia of China in 1977. She graduated from the School of Economics and Management of Aeronautics and Astronautics University of Beijing and was granted Doctor degree of management in 2008. Then she entered the Research Institute of Statistical Sciences of National Bureau of Statistics of China and has been engaged in research on financial and economic statistics, statistical theory and statistical methods since then.