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Can Ownership Diversification Enhance Banks' Efficiency? An Analysis Based on Super Efficiency and Tobit Regression on the Chinese Listed Commercial Banks

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Ownership diversification can improve the monitoring level in commercial banks and hence increase the efficiency. A good case is the Chinese commercial banks which have achieved outstanding performance in the recent years. In the past decade, many Chinese banks have been listed. Going listed has provided opportunities for the banks' ownership to be diversified. Since those banks were controlled more or less by the state before going listing, it is meaningful to study the impacts of ownership diversification on the Chinese listed commercial banks' efficiency. Our sample in this paper includes sixteen Chinese listed commercial banks with data from 2007 to 2011. Herfindahl index is the most widely used proxy to measure the degree of concentration. Hence it can reflect the degree of diversification too. In this paper, we have used Herfindhal index of the largest, the largest three, the largest five and the largest ten shareholders as the proxies for ownership structure. We include these four proxies because in the Chinese listed banks, some are owned by several largest shareholders, while others have much fewer large shareholders. There are several methods to measure the banks' efficiency. To get more precise measurement, we adopt the super efficiency method. Super efficiency has the advantage of higher comparability for the sampled banks. On the other hand, we have used Tobit regression model rather than the ordinary least square (OLS) method because the dependent variable (the super efficiency) is positive. In this paper, we have measured the super efficiency with Data Enveloping Analysis (DEA) and then studied the impacts of the ownership diversification on the efficiency with Tobit regression model. The Chinese listed banks can be categorized into two groups. One is the four formerly state-owned largest commercial banks (hereinafter "Big Four"), the other is the group of smaller banks with less control from the government (hereafter non-Big Four). Because these two groups have different ownership structure, the ownership diversification can influence their efficiency differently. To discover the differences of the impacts from the ownership diversification, we try to compare the impacts of ownership diversification on the efficiency of the formerly state-owned larger banks (Big Four) and smaller banks (Non-Big Four). To overcome the problem of inadequate observations in Big Four sample, we first run Tobit regression with the full sample, and then run Tobit regression with non-Big Four sample. The difference in the coefficients can reveal the different impacts of ownership diversification on the efficiency. Our results indicate that ownership diversification can enhance the listed commercial banks' efficiency. But the coefficients in the non-Big Four sample are smaller than those in the full sample models, which indicate ownership diversification has greater positive impacts on the efficiency of the formerly state-owned larger banks than that of the smaller banks. Our contribution is that our paper is the first one to study the impacts of the ownership diversification on the listed commercial banks which were previously held by the state.

Keywords: *Ownership diversification; Super efficiency; Tobit regression; Data Enveloping Analysis; Chinese listed commercial banks.*

Introduction

The corporate governance literature has long stated that the ownership diversification can change the level of monitoring in a company and hence influence the companies' efficiency (Jensen & Meckling, 1976) and it's also true for banks (Bonin *et al.,* 2004). Since 2000, more and more Chinese commercial banks have gone public. So far there are 16 listed commercial banks in China. Before going listing, nearly all the Chinese banks were owned by the state or the state-owned enterprises, so the ultimate owner was always the state. After going listing, the state only becomes one of the shareholders, though mostly the largest. But anyhow, through going listing, the Chinese commercial banks' ownership has been diversified to some degree and the ownership concentration has decreased.

The original intuition to go listed is to improve the banks' efficiency. For 50 years, the Chinese commercial banks had been owned solely by the state, and the period has witnessed the continuously falling efficiency. To solve this problem, the Chinese government has launched the strategy for the banks to go public.

Before the Chinese commercial banks' going public, the state was by far the largest shareholder of the banks

and the ownership was highly concentrated. Going listed has made the ownership diversification possible in these banks. Then, can share diversification enhance the Chinese listed banks' efficiency? The topic has two-fold implication. Firstly, whether ownership diversification can influence the efficiency is a traditional topic in the field of corporate governance. Secondly, it is a problem concerning the role of government's intervention in the banks. The listed commercial banks in China are not homogenous, including four largest formerly state-owned banks: Industrial and Commercial Bank of China (ICBC), Bank of China (BOC), China Construction Bank (CCB) and Agriculture Bank of China (ABC), and many other smaller banks with less intervention from the government. For the former banks, the ownership diversification indicates a lessened intervention from the government, while for the latter group ownership diversification has much less political color. For the former group, if ownership diversification can improve the banks' efficiency, it implies that the government control is harmful for the banks' efficiency. Hence, the impact of ownership diversification on the banks' efficiency is important for both the Chinese banking sector and the future of the banks in the transitional economies.

Our aim in this paper is to measure the impacts of the ownership diversification on the Chinese listed commercial banks' efficiency and to compare the impacts on all banks and those on non-Big Four banks. In this paper, we will estimate the Chinese listed banks' super efficiency with DEA, use the weight of the top 1, 3, 5 and 10 shareholders' shares as the proxies of ownership diversification, and then try to find the relationship between the banks' ownership diversification and the super efficiency with Tobit model.

Compared with the extant researches, this paper has two major contributions. Firstly, we have adopted the super-efficiency DEA (SE-DEA) in measuring the Chinese listed commercial banks' efficiency. Secondly, our article is the first to analyze the impact of ownership diversification on the Chinese listed banks' efficiency.

Literature Review

A huge number of researches have studied the impacts of ownership concentration on corporate performance. (Jensen & Meckling, 1976) propose that dispersed ownership can separate control and ownership, which would result in suboptimal performance and improve efficiency. (Similarly *et al.,* 1986) find that ownership concentration can improve corporate governance due to an improvement in the monitoring level of management and reduce free-riding which can be frequently found with dispersed ownership. On the contrary, other researches have reached the opposite conclusion. (Stulz, 1988) questions the large shareholder's role in reducing the agency cost and proposes the large shareholding would sacrifice the outside investors' benefits and so decrease the efficiency. The negative impacts of the ownership concentration can also be attributed to the defects caused by high ownership concentration, such as excessive monitoring (Burkart *et al.,* 1997), increased cost of takeover (Kyle & Vila, 1991). Different from the above two opposite ideas, (Demsetz, 1983) argues that ownership structure should be related to the firms' characteristics, so there will be no relationship between ownership and performance.

The present literature has shed light on the importance of bank ownership concentration. Banks' attitude towards risks is very important for their strategy. Some literature has discussed the different impacts of ownership concentration on banks' attitudes towards risks. For example, (Laeven & Levine, 2009) find banks with higher ownership concentration will be apt to take more risk. However, after their analysis on 181 large banks from 15 European countries, (Ianotta *et al.,* 2007) have got opposite conclusion, e.g. banks with concentrated ownership would not take too much risks, and hence have better loan quality, lower asset risk, and lower insolvency risk. (Shehzad *et al.,* 2010) propose a nonlinear impact of ownership concentration on banks' risk. According to their research, the impact depends on shareholder protection and supervisory control.

(Gorton & Rosen, 1995) address the issue of ownership and control for US commercial banks during the 1980s and they find that higher concentration would lead to excessive risks and hence have a poorer performance. Some literature has dealt with the impacts of ownership concentration on other fields of banks' operation. For example, (Banning, 1999) has tested the impacts of ownership diversification on banks' acquisition and found ownership concentration was not a significant predictor of the absolute level of merger activity. (Burkart *et al.,* 1997) have studied the impacts of ownership structure on the firms' management, and argue that tight outside ownership constitutes an expropriation threat that reduces managerial initiatives and noncontractible investments.

There is no consensus on the impacts of ownership concentration on banks' performance and efficiency. Altunbas *et al.,* 2001) have analyzed the impacts of ownership on banks efficiency. Their study has provided little evidence of the advantage of private ownership over the public ownership. (Pinteris, 2002) finds the evidence that there was a negative relationship between bank ownership concentration and bank performance. However, banks' shareholders may collude with managers against deposit holders (Boyd *et al.,* 1998), which may ruin the banks' efficiency. (Magalhaes *et al.,* 2008) find that increasing ownership concentration can increase bank performance when the protection of shareholders is low. (Shehzad *et al.,* 2010) find there are complicated impacts of ownership concentration on bank performance, depending on the government regulation. (Anis & Yosra, 2012) have analyzed the impacts of ownership structure on efficiency of the Tunisian banking sector and find the privatized banks with diversified ownership are more efficient than the banks owned solely by the state.

Efforts have been made to analyze the impact of ownership on bank efficiency in transitional economies. (Berger *et al.,* 2009) try to predict the effects by analyzing the efficiency of Chinese banks over period of 1994–2003. Their findings suggest that Big Four banks are by far the least efficient; foreign banks are most efficient; and minority foreign ownership is associated with significantly improved efficiency. Some researches have been made to discuss the impacts of businesses diversification on banks' efficiency, such as (Deltuvaite *et al.,* 2007) study with the

Lithuanian banks, (Berger *et al.,* 2009)'s research with the Chinese banks.

In China, after going public, the banks have diversified their ownership and experienced changes in their ownership structure, especially the ownership concentration. There lacks the research on the ownership diversification on the banks' efficiency in China.

Methodology and Data

Bank super-efficiency estimation

DEA is the most common approach used to measure efficiency (Seiford & Zhu, 1999). Sherman and Gold (1985) first applied it to measuring banking efficiency and now hundreds of studies have used it for analyzing banks' efficiency.

Under the basic CCR-DEA concept, the decision making units (DMUs) with best performance can get a unit score. This indicates that they are a part of the production frontier. So the comparison of efficiency is impossible if there are too many DMUs having efficiency score of one. To solve this problem, (Andersen & Petersen, 1993) have put forward the concept of super-efficiency Data Envelopment Analysis (SE-DEA). Recently, super efficiency has been measure for financial institutions in many researches (Chen *et al.,* 2010). The super efficiency can be computed by solving the following linear programming methodology:

$$Max: E_j = \sum_{a=1}^{n} v_{aj} Y_{aj}$$

$$s.t. \sum_{b=1}^{m} u_{bj} X_{bj} = 1$$

$$\sum_{\substack{a=1 \\ s \neq j}}^{n} v_{as} Y_{as} \leq \sum_{\substack{b=1 \\ s \neq j}}^{m} u_{bs} X_{bs}$$

$v_{aj}, u_{bj} \geq 0$, for all a, b and j.

A big v_{aj} and small u_{bj} indicate a high super efficiency.

Tobit model

Tobit model was first proposed by Tobin (1958). In this model, a latent variable is assumed to match the observed dependent variable when the latent variable is positive. If the latent variable is negative, the dependent variable would be assumed to be zero. The observed variable would equal 0 when the latent variable is nonpositive.

$$y_i = \begin{cases} y_i^* & if \ y_i^* > 0 \\ 0 & if \ y_i^* \leq 0 \end{cases}$$

Where y_i^* is a latent variable for commercial banks' efficiency. The relationship between the banks' efficiency and the independent variables is as follows:

$$y_i^* = \beta x_i + u_i, \quad u_i \sim N(0, \sigma^2)$$

Where x_i is a series of independent variable, while u_i is the error term where follows a zero-mean normal distribution.

Data

Our sample includes the data of 16 Chinese listed commercial banks and the sample period is from 2007 to 2011. Among these 16 banks, some were listed later than 2007, but their annual reports have provided the data dated back for three years. The sample commercial banks are: China Construction Bank (CCB), Agricultural Bank of China (ABC), Industrial and Commercial Bank of China (ICBC), Bank of China (BOC), China Minsheng Banking Co., Ltd (CMBC), China Merchants Bank Ltd (CMB), Industrial Bank Co., Ltd (CIB), Bank of Beijing (BOB), Bank of Communications (BCM), China Everbright Bank (CEB), China CITIC Bank, Shanghai Pudong Development Bank (SPDB), Shenzhen Development Bank (SDB), China Industrial Bank (CIB), Huaxia Bank (HB), Bank of Nanjing (BON), Zheshang Bank (ZSB), Bank of Ningbo (NBCB). Among them, ICBC, CCB, BOC and ABC are in the first group with by far much larger assets than the other banks. SDB is the first listed bank and ABC went public in 2010.

Our data include the data for SE-DEA, the proxies for ownership diversification, and the data for Tobit models. The data for SE-DEA include three inputs (employee, net assets and assets) and three outputs (net services income, net interest income and net profits). According to (Charnes, *et al.,* 1994), when the number of observations is greater than three times the sum of the inputs and outputs, DEA method would be feasible. Since an identical object in different years can be treated as an individual DMU (Charnes *et al.,* 1978), there are 16 listed commercial banks in a 5-year period, so our analysis contains a total of 80 DMUs (i.e. 16 banks X 5 years). The number of observations is more than three times the sum of the inputs and outputs (6 times 3), so the condition has been satisfied. In our Tobit model, we have included four ownership diversification variables and three control variables. The ownership diversification variables include Herfindahl-Hirschman Index (HHI) of the largest shareholder (HHI1), the top three shareholders (HHI3), top five shareholders (HHI5) and top ten shareholders (HHI10). Since the market share and the macroeconomic situation may influence the banks' efficiency (Chan & Karim, 2010), our control variables include the banks' weight of loans in the banking sector (LOANR), consumer pricing index (CPI) and the lagged term of the super efficiency.

Table 1 has reported the descriptive analysis results of the data. Most of the data vary a lot across the banks in the sampling period. HHI10 has the largest mean value while HHI1 has the smallest. It indicates that top ten shareholders hold more shares than top one, top three or top five shareholders. Among all the banks, CEB and ABC have the highest ownership concentration when they had not been listed before 2009.

Table 1

Descriptive analysis

	Mean	Median	Standard	Maximum	Minimum
DEA variables					
Employee	105053.6	25109.5	149130.2	452464	1629
Net asset	2152.37	1036.76	2619.65	11124.63	84.36
Asset	33863.28	15278.74	39647.95	154768.7	755.11
Net interest income	792.96	349.41	928.84	3627.64	19.56
Net service income	157.29	45.63	229.95	1015.5	0.66
Profit	355.21	139.38	462.06	2084.45	6.140
Ownership diversification proxies					
HHI1	0.186	0.044	0.272	1	0.004
HHI3	0.224	0.062	0.272	1	0.009
HHI5	0.226	0.064	0.271	1	0.012
HHI10	0.228	0.065	0.270	1	0.018
Control variables					
LOANR	0.042	0.022	0.001	0.046	0.156
CPI	3.74	4.8	-0.7	2.400	5.9

Empirical Results

Measurement of banks' efficiency

We have to do test of isotonicity in case that the increase of some inputs may lead to the decrease of banks' output. The results reported in Table 2 have shown that the correlation coefficients are all larger than 0.8, our selection of the inputs and outputs is appropriate.

Table 2

Test of isotonicity

		input			output	
input		employee	net asset	asset	net interest income	net services income
	employee	1				
	net asset	0.867**	1			
	asset	0.927**	0.982**	1		
output	net interest income	0.945**	0.972**	0.985**	1	
	net intermediate income	0.871**	0.986**	0.977**	0.968**	1

*Note: ** significant at 1 % level (2-tailed)*

Table 3 has presented the super efficiency of all the banks from 2007 to 2011. The results have shown a highly volatile efficiency for all the Chinese listed banks. The maximum value of all the efficiency is that of ABC in 2007, with a value of 2.18477, while in 2009, CEB has got the smallest efficiency with a value of 0.57071. 12 among all the observations are greater than 1, indicating a high efficiency. The results in Table 3 have not provided the evidence of increasing trend in efficiency in these years.

Collinearity Test

When there are high correlation among the independent variables, there will arise the collinearity problem in the Tobit regression model. To avoid such a problem, an effective method is to exclude the variables with high correlation from the list of independent variables. So, we have to do the correlation test and the results are in Table 4.

Table 3

Estimate results of supper efficiency

bank efficiency	2007	2008	2009	2010	2011
BOB	0.74735	1.04028	0.86110	0.96481	1.13058
CIB	0.93891	0.91139	0.80504	0.78420	0.84287
NBCB	0.92192	0.94490	0.73605	0.68445	0.90970
SDB	1.08868	0.92037	1.14044	0.84951	1.67881
BOC	0.87598	0.83776	0.64377	0.81365	0.85722
CEB	0.98653	0.91618	0.57071	0.72402	0.79894
CMBC	0.83483	1.01494	0.77145	0.86721	1.36187
SPDB	0.97346	0.97246	0.77919	0.77012	0.88359
ABC	2.18477	0.92869	0.76907	0.79362	0.90154
CITIC	0.91662	0.94042	0.76987	0.84678	0.89612
BCM	0.86287	0.82159	0.67951	0.80548	0.87236
CCB	0.97461	1.00018	0.85112	0.92527	1.05844
HB	0.97555	0.83518	0.72892	0.76647	0.85118
CMB	0.93997	1.02671	0.70076	0.81582	0.98608
ICBC	0.86834	0.90505	0.84803	0.93709	0.99078
BON	0.88121	1.16804	0.76138	0.81196	0.86800

Note: The supper efficiency of the Chinese listed commercial banks is calculated according to method of Andersen and Petersen (1993). The efficiency value is always positive, without any unit and a larger value represents higher efficiency.

Table 4

Collinearity test

Probability	HHI1	HHI3	HHI5	HHI10	LOANR	CPI
HHI1	1					
HHI3	0.986277***	1				
HHI5	0.986396***	0.999937***	1			
HHI10	0.986675***	0.999817***	0.999956***	1		
LOANR	0.374401***	0.487252***	0.487753***	0.485762***	1	
CPI	-0.03653	-0.03277	-0.03199	-0.03171	-0.00638	1

*Note: *, ** and *** indicate significance at 10 %, 5 % and 1 % level (2-tailed) respectively.*

The results have shown a high correlation among the ownership concentration proxies but low or insignificant correlation for the weight of loans and CPI. Hence, we have to use the ownership concentration proxies as the independent variables one by one, while the weight of loans and CPI can be added into the independent variables.

Tobit regression

We first run the Tobit regression for the full sample with Huber/White robust covariance method. The results are presented in Table 5.

For the full sample, the coefficients of the ownership concentration are negative and significant at 1% level, which indicates that the ownership diversification can generally help to improve the listed commercial banks' efficiency. Negative impacts reflect the fact that if the ownership is highly concentrated, the super efficiency would decrease. The ownership diversification as the result of banks' listing can enhance the listed commercial banks' efficiency.

Table 5

Ownership diversification and super efficiency (Full Sample)

	Model I	Model II	Model III	Model IV
Constant	0.373861	0.384980	0.388386	0.391753
SUPEFF(-1)	0.472220*	0.462206*	0.459552*	0.456910*
HHI1(-2)	-0.128240***	/	/	/
HHI3(-2)	/	-0.140156***	/	/
HHI5(-2)	/	/	-0.142213***	/
HHI10(-2)	/	/	/	-0.144133***
LOANR	-1.044369	-0.900695	-0.910756	-0.925081
CPI	0.047151***	0.046913***	0.046821***	0.046732***

*Note: *, ** and *** indicate significance at 10 %, 5 % and 1 % level (2-tailed) respectively.*

Table 6

Wilcoxon signed ranks test

	HHI1	HHI3	HHI5	HHI10
Z value	-3.883	-3.920	-3.920	-3.920
Asymp. Sig. (2-tailed)	0.000	0.000	0.000	0.000

Table 6 has presented the Wilcoxon Signed Ranks Test results for the difference in the ownership diversification between the Big Four and non-Big Four banks. The Z-values of HHI1, HHI3, HHI5 and HHI10 are all significant, so there exists a significant difference in the ownership diversification between these two groups of banks. Then it is meaningful to test the difference in the ownership diversification on the efficiency of these different banks.

Table 7

Tobit regression with non-Big Four banks sample

	Model V	Model VI	Model VII	Model VIII
Constant	0.334226**	0.344160**	0.345743**	0.347383**
SUPEFF(-1)	0.499823***	0.491507***	0.490371***	0.489118***
HHI1(-2)	-0.105652***	/	/	/
HHI3(-2)	/	-0.120215***	/	/
HHI5(-2)	/	/	-0.121415***	/
HHI10(-2)	/	/	/	-0.122439***
LOANR	0.251159	0.347404	0.351587	0.351702
CPI	0.044298***	0.044230***	0.044181***	0.044140***

*Note: *, ** and *** indicate significance at 10 %, 5 % and 1 % level (2-tailed) respectively.*

For non-Big Four, the coefficients of four ownership concentration proxies are significant and negative, but their absolute values are smaller than those of the corresponding coefficients in the full sample results in Table 6, which indicates that the ownership diversification for the smaller banks cannot enhance the efficiency as for the Big Four banks. The results in two tables above indicate that the ownership diversification in the Chinese large banks can help to improve the corporate governance better than for the smaller banks. Our explanation is that the so-called Big Four were typically state-owned banks before their going listing, so they lack appropriate corporate governance. In this case, going listing can diversify the ownership, improve the corporate governance and then enhance the efficiency (Pinteris, 2002). On the contrary, the smaller banks had diversified ownership even before going listing, so going listing has limited effects.

Conclusions

In the past twenty years, especially the past ten years, dozens of the Chinese commercial banks have gone public, which has led to a great degree of ownership diversification in these banks. Meanwhile, the Chinese commercial banks have achieved outstanding performance in the recent five years-with the top profits among the global banks. According to Pinteris (2002)'s research, ownership diversification can increase the monitoring level, improve the corporate governance and then enhance the efficiency. In this paper, we try to test whether the ownership diversification has enhanced the efficiency in the Chinese listed banks with super efficiency and Tobit regression methods. From the analysis, we uncover the following results:

Firstly, the Chinese listed commercial banks have different degrees of ownership diversification. The Big Four banks' ownership is more concentrated.

Secondly, the Chinese listed commercial banks vary a lot in their efficiency and their efficiency has changed a lot in the past 5 years.

Thirdly, the ownership diversification can enhance the Big Four banks' efficiency and the non-Big Four banks' efficiency as well.

Fourthly, the Big Four banks' efficiency can be enhanced more significantly by ownership diversification than the non-Big Four banks.

The implication of our findings is that the commercial banks' efficiency can be improved by going listing, but with different degrees across banks. For the larger formerly state-owned banks, ownership diversification has significant and positive effects on efficiency. So, it can help to enhance the commercial banks' efficiency through going listing and further diversifying their ownership.

Our contribution in this paper is that we have distinguished the impacts of ownership diversification on the banks with different types, namely, Big Four and non Big Four banks.

The further study can be done by distinguishing the impacts of ownership diversification on the different efficiencies, such as operational efficiency and market efficiency.

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Tao Xu

Ar gali nuosavybės diversifikacija padidinti bankų efektyvumą? Kinijos listinguotų komercinių bankų analizė pagrįsta super efektyvumu ir Tobit regresija

Santrauka

Nuosavybės teisės struktūros įtaka įmonių veiklai sulaukė daug dėmesio analizuojant ir akademinę ir praktinę įmonių veiklą. Teorinėje literatūroje, kurioje analizuojamas kolektyvinis valdymas, ilgai buvo teigiama, kad nuosavybės teisės diversifikacija gali pakeisti monitoringo lygį kompanijoje, t. y. daryti įtaką kompanijų efektyvumui. Toks teiginys taip pat tinka ir bankams. Nuo 2000 metų, vis daugiau Kinijos komercinių bankų „išėjo į visuomenę". Iki šiol Kinijoje yra listinguota 16 komercinių bankų. Prieš listingavimą, beveik visi Kinijos bankai priklausė valstybei arba valstybės valdomoms įmonėms, todėl galutinis savininkas visada buvo valstybė. Po „išėjimo į visuomenę", valstybė tapo tik vienu iš akcininkų, (nors dažniausiai turinčiu daugiausiai akcijų), tačiau per listingavimą, Kinijos komercinių bankų nuosavybės teisės buvo diversifikuotos iki tam tikro lygio ir valstybės nuosavybės teisės sumažėjo.

Pradinis Kinijos komercinių bankų „išėjimo į visuomenę" tikslas yra pagerinti jų efektyvumą. Penkiasdešimt metų Kinijos komerciniai bankai priklausė išimtinai valstybei. Priklausymo valstybei laikotarpiu, jų efektyvumas nuolat mažėjo. Norėdama išspręsti šią problemą, Kinijos vyriausybė sukūrė bankams strategiją: „ėjimą į visuomenę".

„ Išėjimas į visuomenę" leido bankams gauti nuosavybės teisių diversifikaciją. Kyla klausimas: ar gali akcijų diversifikacija sustiprinti Kinijos listinguojamų bankų efektyvumą? Ši tema svarbi dviem aspektais: pirmiausia, reikia išsiaiškinti ar nuosavybės teisių diversifikacija gali daryti įtaką efektyvumui, nes tai yra tradicinis klausimas kolektyvinio valdymo srityje. Antra, nuosavybės teisių diversifikacijos įtaka bankų efektyvumui yra problema, kuri susijusi su vyriausybės kišimusi į bankų darbą. Listinguojami komerciniai bankai Kinijoje yra skirtingi, todėl juos galima būtų suskirstyti į dvi grupes. Pirmąją sudaro keturi, anksčiau valstybei priklausę didžiausi komerciniai bankai (toliau Didysis ketvertas): Kinijos pramoninis ir komercinis bankas (ICBC), Kinijos bankas (BOC), Kinijos statybos bankas (CCB) ir Kinijos žemės ūkio bankas (ABC). Antrą grupę sudaro mažesni bankai, kuriuos mažiau kontroliuoja vyriausybė. Jiems nuosavybės teisių diversifikacija rodo silpnesnį vyriausybės kišimąsi, todėl ir nuosavybės teisių diversifikacija turi daug mažesnį politinį atspalvį. Taigi, jei nuosavybės teisių diversifikacija gali pagerinti bankų efektyvumą, vadinasi vyriausybės kontrolė yra žalinga bankams. Nuosavybės teisių diversifikacijos įtaka bankų efektyvumui yra svarbi ne tik Kinijos bankų sektoriui, bet ir būsimiems bankams pasaulio šalyse.

Darbo tikslas - įvertinti nuosavybės teisių diversifikacijos įtaką Kinijos listinguojamų komercinių bankų efektyvumui ir palyginti su įtaka visiems, kartu ir ne Didžiojo ketverto, bankams.

Šiame darbe analizuojama šešiolika Kinijos listinguojamų komercinių bankų, kurių duomenys gauti laikotarpiu nuo 2007 iki 2011 metų. Juos sudaro: duomenys skirti SE-DGA, įgaliojimai nuosavybės teisių diversifikacijai ir duomenys skirti Tobit modeliams.

Herfindahl rodiklis yra plačiausiai naudojamas norint įvertinti koncentracijos laipsnį. Taip pat jis gali parodyti ir diversifikacijos laipsnį. Šiame

darbe mes naudojame Herfindhal rodiklį didžiausiam, trims didžiausiems, penkiems didžiausiems ir dešimčiai didžiausių akcininkų. Mes įtraukėme keturis indeksus, nes kai kurie Kinijos listinguojami bankai priklauso keliems didžiausiems akcininkams, o kiti turi gerokai mažiau stambių akcininkų.

Šiame darbe mes įvertinsime Kinijos listinguojamų bankų super efektyvumą, panaudodami DGA. Naudosime svarbiausių 1, 3, 5 ir 10 akcininkų akcijų Herfindahl rodiklius, kaip nuosavybės teisių diversifikacijos indeksus, o tada bandysime rasti ryšį tarp bankų nuosavybės teisių diversifikacijos ir super efektyvumo, panaudodami Tobit modelį.

Egzistuoja keletas metodų bankų efektyvumams įvertinti. Norėdami gauti daug tikslesnį įvertinimą, mes pritaikome super efektyvumo metodą. Pagal pagrindinę CCR-DGA koncepciją, sprendimų priėmimo grupės (SPGs), turėdamos geriausią veiklą, gali gauti grupės rezultatą. Tai rodo jos gamybos ribotumą. Todėl efektyvumo palyginimas neįmanomas, jei yra per daug SPGs-ų, kurių rezultatas lygus vienetui. Norint išspręsti šią problemą, Andersen ir Petersen (1993) pasiūlė super efektyvumo Duomenų gaubiamosios analizės (SE-DGA) koncepciją. Neseniai, super efektyvumas buvo finansinių institucijų priemonė įvairiuose tyrimuose. Super efektyvumas turi didelį privalumą lyginant pavyzdžiais pasirinktus bankus. Iš kitos pusės, mes dažniau naudojome Tobit regresijos modelį, negu paprasto, mažiausio kvadrato (PMK) metodą, nes priklausomas kintamasis (super efektyvumas) yra teigiamas. Tobit modelį pirmasis pasiūlė Tobin (1958). Šiame modelyje slaptas kintamasis atitinką nustatytą priklausomą kintamąjį, kai slaptas kintamasis yra teigiamas. Jei slaptas kintamasis yra neigiamas, priklausomas kintamasis bus prilyginamas nuliui. Nustatytas kintamasis bus lygus 0, kai slaptas kintamasis yra neigiamas.

Taigi mes įvertinome super efektyvumą, panaudodami Duomenų gaubiamąją analizę (DGA), o tada tyrėme nuosavybės teisių diversifikacijos įtaką efektyvumui, panaudodami Tobit regresijos modelį.

Prieš įvertindami super efektyvumą, mes turime patikrinti izotoniškumą tuo atveju, jei kai kurių sąnaudų padidėjimas sumažintų bankų našumą. Rezultatai parodė, kad koreliacijos koeficientai yra didesni kaip 0,8. Todėl mūsų sąnaudų ir našumo pasirinkimas yra tinkamas.

Mūsų super efektyvumo įvertinimas parodė labai nevienodą, visų Kinijos listinguojamų bankų efektyvumą. Maksimali efektyvumo vertė tarp visų bankų priklauso ABC 2007 metais. Vertė buvo lygi 2.18477, kai 2009 metais CEB turėjo mažiausią efektyvumą, kurio vertė buvo lygi 0.57071. Tarp visų tiriamųjų bankų, 12-os rodikliai yra didesni už 1, rodantį aukštą efektyvumą.

Vėliau pasirinktas pavyzdys buvo padalintas į dvi dalis. Buvo įvertinta nuosavybės teisių diversifikacijos įtaka ne Didžiojo ketverto bankų efektyvumui. Ne Didžiojo ketverto pavyzdžio lyginimas su visais pavyzdžiais buvo atliktas, norint atskirti skirtingą nuosavybės teisių diversifikacijos įtaką. Kadangi šių dviejų grupių nuosavybės teisių struktūra yra skirtinga, nuosavybės teisių diversifikacija gali paveikti ir jų efektyvumą skirtingai. Norėdami atrasti skirtingų nuosavybės teisių diversifikacijų įtakos skirtumus, mes bandome palyginti nuosavybės teisių diversifikacijos įtaką anksčiau valstybei priklausiusių didelių bankų (Didžiojo ketverto) efektyvumui ir mažesnių bankų (ne Didžiojo ketverto) efektyvumui. Norėdami įveikti netinkamų stebėjimų problemą Didžiojo ketverto pavyzdyje, mes pirmiausia atliekame Tobit regresiją ne Didžiojo ketverto pavyzdyje. Koeficientų skirtumas gali parodyti skirtingą nuosavybės teisių diversifikacijos įtaką efektyvumui.

Ne Didžiajam ketvertui, keturių nuosavybės teisių koncentracijos įgaliojimų koeficientai yra svarbūs ir neigiami, bet mažesni, negu atitinkami koeficientai viso pavyzdžio rezultatuose, kurie rodo, kad nuosavybės teisių diversifikacija mažesniems bankams negali sustiprinti efektyvumo, kaip kad Didžiojo ketverto bankuose. Anksčiau dviejose lentelėse pateikti rezultatai rodo, kad nuosavybės teisių diversifikacija dideliuose Kinijos bankuose gali labiau pagerinti kolektyvinį valdymą, negu mažesniuose bankuose. Mūsų paaiškinimas būtų toks: Didysis ketvertas buvo tipiški, valstybės valdomi bankai prieš „išėjimą į visuomenę", todėl jiems trūko atitinkamo kolektyvinio valdymo. Tokiu atveju, listingavimas gali diversifikuoti nuosavybės teises, pagerinti kolektyvinį valdymą ir po to sustiprinti efektyvumą. Ir priešingai, maži bankai diversifikavo nuosavybės teises dar prieš listingavimą, todėl listingavimas apribojo poveikį.

Mūsų rezultatai rodo, kad nuosavybės teisių diversifikacija pagerino bendrą Kinijos didelių komercinių bankų efektyvumą, bet silpniau veikė ne Didžiojo ketverto bankus. Mūsų rezultatų reikšmė yra ta, kad komercinių bankų efektyvumą galima pagerinti listinguojant, tačiau skirtingais laipsniais tarp bankų. Didesniems, anksčiau valstybei priklausiusiems bankas, nuosavybės teisių diversifikacija daro didelę ir teigiamą įtaką efektyvumui.

Lyginant su ankstesniais tyrimais, šis darbas turi du svarbius indėlius. Pirmiausia, mes pritaikėme super efektyvumo DGA (SE-DEA), vertindami Kinijos listinguojamų komercinių bankų efektyvumą. Antra, mūsų straipsnyje pirmiausia analizuojama nuosavybės teisių diversifikacijos įtaka Kinijos listinguojamų komercinių bankų efektyvumui.

Be to, mes išskyrėme nuosavybės teisių diversifikacijos įtaką skirtingų tipų bankams, t. y. Didžiojo ketverto ir ne Didžiojo ketverto bankams. Mūsų tyrimo išvadas galima taikyti bankams buvusiose centralizuoto planavimo šalyse. Kitą tyrimą galima atlikti išskiriant nuosavybės teisių diversifikacijos įtaką skirtingiems efektyvumams, tokiems kaip eksploatacinis efektyvumas ir rinkos efektyvumas.

Raktažodžiai: *Nuosavybės teisės diversifikacija; super efektyvumas; Tobit regresija; Duomenų gaubiamoji analizė; Kinijos listinguojami komerciniai bankai.*

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