Productivity Change and Restructuring of Vietnamese Banking System: An Empirical Study using Malmquist Indices Analysis

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Abstract

This study aims to examine the performances of Vietnamese banks. Especially, we use a unique data set covering all type of banks in Vietnamese banking system that allows us to capture the effect of the most recent reform so-called "Restructuring financial institutions" on the productivity of Vietnamese banks. To do so, Malmquist indices analysis is applied to estimate the total factor productivity (TFP) change of 30 Vietnamese banks for the period from 2009 to 2014. A decrease of TFP of Vietnamese banking system was observed for the pre-restructuring period while it shows an increase since the restructuring program started regarding value-added and intermediate approaches. Noticeably, among these TFP increases, joint stock banks had the highest TFP improvement, with 13.5% refer to value-add estimation which focuses on maximizing banking services provided. As for the intermediate estimation, foreign and joint venture group showed the highest TFP increase of 49%. Our result confirms an appropriateness of the restructuring program on the performances of Vietnamese banks. It implies that, for the next stage of financial reform, policymakers should consider continuing the promotion policy of merger and acquisition, self-restructuring as potential tools to solve problems of existing weak banks and therefore be able to strengthen and make Vietnamese banking system more effective.

Key words: Vietnamese banks, Productivity, Malmquist index, Restructuring

I. Introduction

Performance evaluations of financial institutions which take into account of the appropriateness as well as the results of key reforms have become one of the main issues for the study on the financial industry. Issues in banking reforms vary among liberalization, privatization, recapitalization, merger and acquisition activities, and self-restructuring program. Although most transition economies have followed the same path for the banking sector's transformation the pace and results are different from one country to another. In fact, the answer to the question "whether these kinds of reforms have made banking sector perform better?" has been a debate in the literature. For instance, some previous studies suggested that financial reforms improve banking performance

(Berg *et al*., 1992; Kumbhakar and Sarkar, 2003; Das and Gosh, 2006). In contrast, other studies found that financial reforms have no effect or led to a decline in operating performance (Elyasiani and Mehdian, 1995; Fukuyama and Weber, 2002).

Throughout the past three decades, the Vietnamese banking system has witnessed various changes along with economic development. The Vietnamese Government has implemented banking reforms to improve the efficiency and the competitiveness of the banking system in the country. Recently, the State Bank of Vietnam started a program called "Restructuring financial institution 2011-2015". The main target for restructuring the financial institutions is to improve efficiency and financial performance of the banking system. Banking system's performance, therefore, becomes the extremely important information for not only regulators but also for the customers, managers, and even the shareholders.

In this study, the total factor productivity (TFP) change of Vietnamese banks is examined by applying Malmquist indices analysis, especially TFP is analyzed for two periods of time before and after the restructuring program started. The study tests whether the performance of Vietnamese banks has improved under the restructuring plan or not. Finally, considering main findings of the study, implications which aim to achieve better performance in banking operation are suggested.

The contribution of this study to the literature is that multiple approaches which are known as "intermediate approach" [2] and "value-added approach" [3] are applied to banking performance evaluations. In fact, previous studies rely mainly on the intermediate approach. Thus, it is expected to perform more comprehensive evaluation of banking performances. The study is also the first study that examines the performance of all banks including foreign players in the Vietnamese banking industry. Importantly, it provides evidence of TFP change of the banking industry in response to the first financial restructuring program since it would catch the movement in banking system's performance after starting the restructuring plan.

Our results show that although the TFP of Vietnamese banking system decreased in the pre-restructuring period, it has actually gone up since the restructuring program started regarding both approaches applied. The increase in TFP is mainly contributed by technical change rather than efficiency change. The improvement of TFP in the restructuring period confirms the suitability of the restructuring program on Vietnamese banks' performances.

The structure of the paper is as follows. The second section briefly introduces the background of Vietnamese banking system, focusing on banking reforms. A summary of the literature on the productivity of banking system is provided in the next section. In the fourth part, we present Malmquist indices methodology framework to estimate the total factor productivity change. Following that, the empirical model of banking operating evaluation, data used and our main findings are outlined in sections five and six, respectively. The last section brings the main conclusion and implications.

II. Reforms in Vietnamese Banking System

From 1990 onward, the Vietnamese government has conspicuously and purposely implemented reform policies directed toward deregulation, with the objectives of improving the efficiency and stability of the banking

system. The market has gradually been deregulated to allow entry of foreign banks. The State Bank of Vietnam has, since 2008, granted licenses to wholly foreign-owned banks. At the beginning of 2009, HSBC Bank (Vietnam) which is 100 percent owned by Hong Kong and Shanghai Banking Corporation Limited, became the first wholly foreign-owned bank operating in Vietnam. Following that, Standard Charted Bank, ANZ Bank, Shinhan Bank and Hong Leong Bank obtained a permit to establish wholly foreign-owned subsidiary banks incorporated in Vietnam. In their few years of operations, the wholly foreign-owned banks have reported making profits because of the high demand for foreign investors to open bank accounts with these banks for financing trade and foreign exchange purposes.

The next key movement was related to the privatization of the state-owned banks (SOCB) and the support of government for the listing of all local banks on the stock exchange market. The target of these policies was to reduce the state ownership in state-owned banks by 49% by 2010. Following that, the number of local banks that listed in the stock exchange market had raised from 6 in 2006 to 9 in 2016. The Government of Vietnam intends to partially privatize most SOCB's. However, such kind of plans seems to move slowly (Tran, 2015). The process of equitization would give permission for foreign investors to buy shares which cap foreign equity up to maximum 30 percent. In fact, Vietcombank's pilot initial public offering conducted firstly in December 2007. Vietinbank was equitized in December 2008. BIDV's took place in 2011. These three state-owned banks, Vietcombank, Vietinbank, and BIDV, are now listed on the stock exchange market.

Regarding the recent comprehensive reform, the schedule to restructure the system of financial institutions for the period from 2011 to 2015 was announced by the Prime Minister of Vietnam on March 2012 under Decision 254. The regulators announced banking industry consolidation as one of the main objectives of its restructuring plan. As a part of this plan, the State Bank of Vietnam aimed to reduce the number of local commercial banks to around 20 by 2017 through mainly merger and acquisition activities and self-restructuring. In details, the schedule of this program begins with the fact that Vietnamese commercial banks are classified into three groups from healthy, lack of liquidity and weak level according to their financial conditions and management. Following that, SBV tries to encourage healthy banks for their extension businesses, and refinance credit for the second level banks to solve liquidity problems. As for weak banks, they are encouraged to merge with other potential partners, voluntarily. If they fail to do that, they will be forced to be bought by SBV or to let other banks purchase their shares according to SBV's recommendation. Also, the minimum charter capital was raised from VND 1 trillion to VND 3 trillion and the minimum required capital adequacy ratio (CAR) was increased from 8% to 9% to meet this entry objective and raise barriers to entry to the Vietnamese banking industry. The main target of this restructuring program is to improve and strength operation performance of Vietnamese banking system, make them more effective.

III. Related Literature Review

Most of the empirical studies on performances of banks had concentrated on the change in technical efficiency by using either nonparametric or parametric method. In addition, studies examining effects of financial

reforms on banking performance found mixed results. A positive impact of financial reforms on banks operation was observed in the study of Berg *et al*., 1992; Kumbhakar, 2003; Sturm, 2002, Das and Gosh, 2006. For instance, Das and Gosh (2006) estimated the efficiency of commercial banks in India for the period from 1992 to 2002 after reform. They concluded that banks' performance improved in the case of India commercial banks. Also, Sturn (2002) considered the efficiency of banks in Australia during the post-deregulation period from 1988 to 2001. It showed an increase in efficiency in the post-deregulation period. By contrast, Bauer (1993) found that the efficiency of the banking system in the U.S. was unchanged by deregulation. Moreover, the efficiency of banks in Japan decreased between 1992 and 1996 (Fukuyama and Weber, 2002).

To the best of our knowledge, there were few studies that examined TFP change in South East Asia countries' banking systems under the financial reform. As for Vietnam, there were three papers that used Malmquist indices analysis to measure the change in TFP of banks. Nguyen (2007) first examined the efficiency of 13 Vietnamese commercial banks from 2001 to 2003 by applying Data envelopment analysis and Malmquist indices. It showed that TFP had increased by 5.7% over research time. On the other hand, Nguyen and De Bonger (2008) extended the sample size into 15 banks to estimate the TFP of Vietnamese banks from 2003 to 2006 and indicated a downward trend of TFP. Recently, Nguyen and Simioni (2015) used Fare-Primont index and focused on the evolution of productivity of Vietnamese local banks for the period between 2008 and 2012. The results from these studies complement each other to make observations on the development of the Vietnamese banking system. However, these three studies only focused on the operation of Vietnamese local banks, ignored the participation of foreign and joint venture banks which have gradually increased their market share. In addition, all of them had applied the same intermediate approach. Vietnam has recently completed a five-year restructuring plan and is now preparing for another stage of an overhaul. Therefore, it is necessary to conduct a study that suggests evidence showing the effect of restructuring program on banking system's performance. Its implications are useful to regulators when making decisions for the next plan of Vietnamese bank reorganizing.

IV. Methodology

The Malmquist productivity index can be used to identify productivity differences between two firms or one firm over two time periods. To estimate technical efficiency changes and technological changes over the period, this study applies decomposed Malmquist productivity index based on ratios of distance functions. Fare *et al*. (1994) specify and output-based Malmquist productivity change index as:

$$m_0(x^{t+1}, y^{t+1}, x^t, y^t) = \sqrt{\left(\left[\frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^t(x^t, y^t)}\right]\left[\frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^t, y^t)}\right]\right)}$$

Where x^t and y^t represent the input and output variables, respectively; Dt denote the function that projects the distance from the technology frontier to observation in the period t. The Malmquist productivity index (M) of total factor productivity (TFP) change is geometric mean of two indexes based on the technology used in period t and t+1, respectively. In other words, M=ET, Where M

is Malmquist productivity index x; E is change in efficiency from period t to t+1; and T is the measure of technical progress measured by shifts in the frontier from period t to t+1. When the reference technology is based on period t, then if productivity increases, implies that the Malmquist index is greater than 1. Productivity decrease in association with the Malmquist index lower than 1.

Regarding input and output choices, there is no perfect combination for banking efficiency evaluation. Reasonable arguments can be made for all approaches. From the literature, there are two common approaches to the input and output specifications of financial institutions. They are the production approach and the intermediate approach.

Sealey and Londley (1977) first introduced the intermediation approach which assumes that the main aim of banks is to transform liabilities (deposits) into loans (assets). Following this, inputs may include labor, capital, operating costs and interest expenses, while outputs are measured by monetary values of varied earning assets, for instance, loans and investment.

As for value-added approach which is also named as production approach, it focuses on the capacity of providing bank's services to their customers. Thus, the main aim of banks is to produce liabilities (deposits) as well as loans (assets) and other services. This approach was first applied to the banking sector by Benston (1965).

This study applied both intermediate approach and value-added approach when evaluating bank efficiency. While intermediate approach focuses mainly on the traditional business of banks, value-added approach estimation can widen the scope of the banking business. Therefore, findings from these both estimations are expected to bring a better understanding of bank performance.

Table 1 describes the outputs and inputs used in this study. Regarding the value-added approach, three outputs and three inputs are used in Model 1. Loans, deposits, and investment securities are considered as outputs. The three inputs are interest expense, operating expense, which includes staff expense, and provision for loan loss. Provision for loan loss should be an input of banks due to its value as an important source of information that reflexes the risky assets holding cost within bank system. On the other hand, Model 2 refers to the intermediation approach which emphasizes the main role of banks as the intermediations in the economy. Model 2 uses loans and investment securities as output while treating deposits, operating

Table 1. Variables used in the value-added and the intermediate approaches (Unit: VND1million)

	Outputs	Inputs
Model 1	Loans	Interest expense
Value-added approach	Deposits	Operating expense
	Investment securities	Provision for loan loss
Model 2	Loans	Deposits
Intermediate approach	Investment securities	Operating expense
		Equity

expense and also equity as inputs.

V. Data

A set of data was collected from the annual reports of the State Bank of Vietnam and also the annual financial reports of the individual banks for the sample from 2009 to 2014. The information of 30 banks, which include all types of banks in the Vietnamese banking industry (state-owned banks, the joint stock banks, joint venture and foreign banks), is examined in this study.

Table 2 lists the descriptive statistics of input and output data. The main feature we can observe in this table is the large dispersion of data for all inputs and outputs. The sample appears to be a mixture of relatively small-size banks with much larger ones.

VI. Empirical Results

The Malmquist productivity indices analysis is used to examine the change in the performance of Vietnamese banking system over time.

Table 3 presents the results of calculation of total factor productivity and efficiency changes of Vietnamese banks over a six-year period from 2009 to 2014. The Malmquist indexes represent the change in total factor productivity (TFP). The measured values of greater than 1 indicate improvements in productivity while it shows deterioration of productivity if the values are less than 1. Furthermore, the TFP change can be decomposed into efficiency change, which shows the catch-up to the productivity frontier in individual banks or the change in relative technical efficiency, and technical change, which shows the shift in productivity frontier. Similarly, both scores indicate an improvement if they are greater than 1 and deterioration if they are less than 1. The shift of the frontier reflects the technological progress that has happened inside the analyzed sample of firms or banks. The change in relative technical efficiency of a firm within the analyzed sample of firms during the course of time reflects the shift of the firm with respect to the efficient frontier of the sample at the beginning and at the end of the observed interval.

The empirical results are as follows: First, the TFP of Vietnamese banking sector has a slight increase over a six-year period from 2009 to 2014 regarding the value-added approach. On the other hand, according to the intermediate approach, it has a small decrease in TFP.

However, when we look at the TFP which was divided into the efficiency change (the catch-up effect) and the technical change (the frontier shift), the similar trend happened as for the value-added approach as well as the intermediate approach. It is the fact that the study period witnessed not only a slight drop in efficiency change but also an increase in the technical change. In addition, the technical change in the value-added approach is higher than that in intermediate approach. These lead to the observation that the TFP has increased in the value-added approach while TFP refers to the intermediate approach has decreased slightly over the research time.

In addition, taking a look at the TFP change over the whole period among three groups of banks, according to **Table 4**, joint stock banks are the only group which had an increase in TFP with value-added estimation while foreign & joint venture banks are the only group which had a rise in TFP according to intermediate approach. These observations may indicate that when focusing on providing total banking services, joint stock banks had the highest

Table 2. Descriptive statistics of inputs and outputs by year (Unit: VND 1 million)

Year	Variable	Obs	Mean	Std. Dev.	Min	Max
2009	Loans	28	34,200,000	50,100,000	317,529	201,000,000
	Deposits	28	37,400,000	50,800,000	677,246	187,000,000
	Investment securities	28	8,160,918	11,400,000	15,693	39,000,000
	Interest expense	28	2,504,064	3,412,539	138,921	15,900,000
	Operation expense	28	870,623	1,128,065	46,668	4,536,214
	Provision for loan loss	28	228,542	392,009	11,936	1,936,559
Year	**Variable**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
2010	Loans	28	46,700,000	65,100,000	2,670,397	249,000,000
	Deposits	28	50,100,000	65,300,000	3,181,319	245,000,000
	Investment securities	28	14,300,000	15,600,000	814,407	61,600,000
	Interest expense	28	4,483,033	5,464,903	334,320	20,600,000
	Operation expense	28	1,262,330	1,731,350	73,997	7,197,137
	Provision for loan loss	28	343,155	617,561	3,113	2,659,495
2011	Loans	28	54,200,000	78,300,000	3,149,070	290,000,000
	Deposits	28	57,200,000	72,700,000	1,254,258	257,000,000
	Investment securities	28	16,000,000	16,000,000	1,160,363	67,400,000
	Interest expense	28	8,137,091	9,135,221	530,486	35,700,000
	Operation expense	28	1,778,941	2,130,186	208,355	9,077,909
	Provision for loan loss	28	657,104	1,387,455	0	5,063,769
2012	Loans	28	61,600,000	89,600,000	3,648,741	334,000,000
	Deposits	28	70,900,000	86,100,000	1,501,086	303,000,000
	Investment securities	28	18,100,000	21,300,000	1,185,667	78,500,000
	Interest expense	28	7,146,188	7,424,428	454,888	32,200,000
	Operation expense	28	2,048,117	2,246,548	296,265	9,435,673
	Provision for loan loss	28	741,976	1,168,127	0	4,357,954
2013	Loans	28	70,900,000	102,000,000	3,879,232	385,000,000
	Deposits	28	84,500,000	101,000,000	1,739,554	364,000,000
	Investment securities	28	21,600,000	22,200,000	1,049,068	83,000,000
	Interest expense	28	5,684,712	5,967,842	289,517	26,000,000
	Operation expense	28	2,130,761	2,351,955	298,497	9,909,654
	Provision for loan loss	28	915,416	1,493,851	0	6,482,862
2014	Loans	28	82,300,000	118,000,000	3,099,736	439,000,000
	Deposits	28	103,000,000	125,000,000	1,523,161	440,000,000
	Investment securities	28	26,800,000	25,800,000	2,128,387	93,400,000
	Interest expense	28	5,699,954	6,632,466	177,968	27,100,000
	Operation expense	28	2,282,988	2,499,849	319,213	9,804,496
	Provision for loan loss	28	1,087,930	1,649,266	0	6,985,696

Source: Financial statements of 30 Vietnamese banks in the period of 2009-2014

improvement in performance over the study period. Also, when emphasizing the main aim of banks as intermediations between depositors and borrowers the best improvement in TFP was observed in the foreign & joint venture group. On the other hand, the state-owned group, on

Table 3. Total factor productivity change, efficiency change effect and technical change effect of Vietnamese banking system from 2009-2014

	Value-added approach			Intermediate approach		
	effch	**techch**	**tfpch**	**effch**	**techch**	**tfpch**
2009-2010	0.920	1.124	1.034	1.057	0.995	1.051
2010-2011	1.059	0.737	0.780	1.008	0.929	0.936
2011-2012	0.924	0.978	0.904	0.979	0.854	0.836
2012-2013	1.058	1.177	1.245	0.974	1.088	1.059
2013-2014	0.996	1.259	1.254	0.956	1.174	1.132
Whole period 2009-2014	**0.989**	**1.037**	**1.026**	**0.996**	**1.001**	**0.997**

Source: Malmquist estimation by DEAP and author's calculation

Table 4. Total factor productivity change, efficiency change and technical change of Vietnamese banking system from 2009 to 2014 by groups of banks

	Value-added approach			Intermediate approach		
	effch	**tech**	**tfpch**	**effch**	**tech**	**tfpch**
State-owned	1.009	0.985	0.992	1.000	0.987	0.987
Joint Stock	0.982	1.047	1.031	0.992	0.999	0.992
Foreign & Joint venture	1.016	0.975	0.991	1.019	1.138	1.159
All banks	**0.989**	**1.037**	**1.026**	**0.996**	**1.001**	**0.997**

Source: Malmquist estimation by DEAP and author's calculation

average only showed a decrease in TFP over the research time for both approaches.

As mentioned earlier, this study aims to examine the performance of the Vietnamese banking system under the most recent and significant restructuring program started in the late 2011. **Table 5** summarizes the Malmquist decomposition results of the Vietnamese banking system in two separate periods of time: so-called pre-restructuring and restructuring period.

Regarding the period before the restructuring program, the TFP of Vietnamese banking system decreased in both value-added and intermediate calculations. The main reason for the drop in TFP is the significant decrease of technical change effect. Technical efficiency increased over that period.

In contrast, after the government took the action to restructure in the late 2011, the TPF marked a significant increase in 2011-2014, by, 16% in the value-added approach and 17% in the intermediate approach. Similarly, the TFP increase was mainly because of the significant contribution of technical change effect.

Furthermore, among three groups of banks, in the pre-restructuring period, only joint stock banks showed increases in TFP while these other two groups showed decreases in TFP for both intermediate and value-added approaches. However, in the restructuring period, three groups of banks had increases in TFP mainly

Table 5. Total factor productivity change, efficiency change effect and technical change effect of the Vietnamese banking system in the pre-structuring period and the restructuring period

		Value-added approach			Intermediate approach		
		effch	**tech**	**tfpch**	**effch**	**tech**	**tfpch**
Pre-restructuring (2009-2011)	State-owned	1.020	0.784	0.796	1.043	0.942	0.985
	Joint Stock	0.997	1.059	1.039	1.039	0.974	1.019
	Foreign & Joint venture	1.041	0.803	0.844	1.048	0.935	0.985
	All	**1.019**	**0.882**	**0.893**	**1.044**	**0.951**	**0.996**
		effch	**tech**	**tfpch**	**effch**	**tech**	**tfpch**
Restructuring (2012-2014)	State-owned	1.012	1.164	1.177	0.978	1.024	1.000
	Joint Stock	1.005	1.151	1.171	0.975	1.048	1.023
	Foreign & Joint venture	1.003	1.134	1.135	1.010	1.392	1.498
	All	**1.007**	**1.150**	**1.161**	**0.987**	**1.155**	**1.174**

Source: Author's calculation

because of technical change. Furthermore, taking a look at efficiency changes of Vietnamese banks in this restructuring period, it is clear that the efficiency measures of three groups of banks are greater than one in the value-added approach. It implies that the performance of banks in Vietnam improved under the restructuring program. It also somehow indicates a positive effect of the restructuring program by the government on the performance of Vietnamese banks. Noticeably, foreign and joint venture banks showed a significant increase TFP, by 50%, regarding intermediate approach. This observation implies that despite the shorter participating time in the banking market, foreign and joint venture banks have started improving their business operating as financial intermediaries in the local market since reform conducted.

VII. Conclusion

According to Malmquist productivity index analysis, there was a difference in TFP changes of Vietnamese banks in the two periods examined. Both value-added and intermediate approach estimations observe the same trend. In fact, in the pre-structuring period, this Malmquist index was less than 1, implying a decrease in TFP while it has increased by 16.1% and 17.4% refer to value-added and intermediate estimation, respectively, in restructuring period. The intermediate approach emphasizes the main role of banks as intermediaries between borrowers and savers. As for this traditional focusing estimation, foreign and joint venture group showed the highest improvement in TFP while the most successful one in TFP change in value-added term was the joint-stock group. The results confirm that the restructuring has a positive effect on TFP changes of Vietnamese commercial banks.

Observations figured out from the study provide evidence showing a positive effect of the restructuring program, which has the main aim to raise the stability and efficiency of the banking system, on the performance of banks in Vietnam. The fact that foreign and joint

venture group seem to be successful in TFP improvement implies banks which have foreign shares in capital structure might operate more effectively. The government should consider promoting foreign investors to buy more shares in local banks, especially in small banks or existed weak banks by increasing the permitted maximum share of a foreign investor's equity in a local bank.

Notes

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2) The intermediate approach focuses mainly on the traditional business of banks, considering the main aim of banks is transferring deposits into loans. Deposit is referred as input while loan is considered as output.
3) The value-added approach considers providing all bank services as the main function of banks. Thus, loan and deposit are referred as outputs in this approach.

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Appendix

List of banks in the sample

ID	Name of Bank
1	Asia Commercial Joint Stock Bank
2	An Binh Commercial Joint Stock Bank
3	Viet Capital Commercial Joint Stock Bank
4	LienViet Commercial Joint Stock Bank
5	Vietnam Bank for Industry and Trade
6	Joint Stock Commercial Bank for Investment and Development of Vietnam
7	Dong A Commercial Joint Stock Bank
8	Southeast Asia Commercial Joint Stock Bank
9	The Maritime Commercial Joint Stock Bank
10	Tien Phong Commercial Joint Stock Bank
11	Viet Nam Technological and Commercial Joint Stock Bank
12	Nam A Commercial Joint Stock Bank
13	Joint Stock Commercial Bank for Foreign Trade of Vietnam
14	Mekong Development Joint Stock commercial Bank
15	Housing development Commercial Joint Stock Bank
16	Orient Commercial Joint Stock Bank
17	Military Commercial Joint Stock Bank
18	Vietnam International Commercial Joint Stock Bank
19	National Citizen bank
20	Saigon Bank for Industry &Trade
21	Saigon-Hanoi Commercial Joint Stock Bank
22	Saigon Thuong Tin Commercial Joint Stock Bank
23	Viet A Commercial Joint Stock Bank
24	Vietnam Commercial Joint Stock Bank for Private Enterprise
25	Petrolimex Group Commercial Joint Stock Bank
26	Viet nam Commercial Joint Stock Exim
27	Indovina Bank
28	HSBC Vietnam