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MARKET CONCENTRATION AND COMPETITION IN VIETNAMESE BANKING SECTOR

M.Sc. Le Hai Trung

Abstract

Vietnamese banking system has been playing a vital role in the development and economic growth since the economic renewal campaign namely “Doi Moi” in 1986. However, since the global financial crisis, financial and banking system has been under stress, exposing much weaknesses, severely affecting the whole economy. Additionally, the wave of financial liberalization raise questions about the competitiveness of Vietnamese commercial banks in the competition with the foreigners. The main purpose of this paper is to measure the market concentration using Hirschman-Herfindahl index (HHI) and test for the market competition in Vietnamese banking sector under Panzar – Rossse approach by an unbalanced panel data of 33 commercial banks for the period from 2004 to 2013. Vietnamese banking sector is found to be high-concentration although it is experiencing a decreasing trend. The test for market competition indicate a monopolistic behavior of Vietnamese commercial banks. No surprising, the state-owned commercial banks and foreign banks are found to be superior in the competition with joint-stock commercial banks and domestic banks respectively. In addition, the foreign investment in banks seem to increase competitiveness of a commercial bank.

1. Introduction

Since 1986, Vietnamese government launched an economic renewal campaign namely “Doi Moi” to strengthen and promote economic development and growth in order to become a more open and market oriented economy. It is undoubtedly that Vietnamese banking sector has contributed a large part in the economic expansion recently. The banking sector has been developing substantially in recent years since the banking market has been opened to both foreign and private sector banks in 1991. The number of banks in Vietnam comes to 104 banks (as in 31/12/2012), including 1 state-owned commercial bank (Agribank), 4 partial state-owned commercial banks (Vietinbank; Vietcombank; BIDV and MHB), 33 joint-stock commercial banks, 5 whole foreign-owned banks, 4 joint-venture commercial banks and 55 foreign bank’s branches and

subsidiaries. By the end of 2011, the total domestic of credit provided by banking sector constituted to 120.8% of GDP, while domestic deposit to banking sector accounted for 106.56% of GDP. High-level of credit growth of around 30% in a long-time periods was one of the most important factor in the high-rate of Vietnamese economic development and growth.

One of the most striking feature of Vietnamese banking sector is the domination of state-owned banks and partial state-owned banks (From now onwards, they are all called state-owned banks – SOCBs as government is having controlling right in all of these bank with over 51% of total chartered capital). These state-owned banks' assets account for about 50% of the total banking sector's assets, together with 48% in deposit and 52% in credit market-share, leading to very high market concentration. However, this market concentration has been decreasing considerably due to the increase of market share of domestic joint-stock commercial banks and foreign banks.

In addition, Vietnamese banking system has been being under an unavoidable financial globalization trends as well as dramatic advancement in information and banking technology. According to Linda S.Goldberg (2008), globalization can help the host countries receiving the services of globally-oriented banks. It can also have positive effect in real foreign direct investment, technology transfers, and productivity enhancement. Hence, for developing countries such as Vietnam, it is a crucial requirement to participate in globalization process. The globalization in banking sector could change the market structure and behaviour of Vietnamese banking industry. For instance, the increased presence of foreign banks has imposed the needs to enhance the competitiveness and strength of domestic commercial banks, including partially privatizing SOCBs and strengthening bank capital requirement.

As a result, measuring and understanding the current state and trends in market concentration and competition in Vietnamese banking industry could give some implications to government and banking supervisor (State Bank of Vietnam - SBV) to improve the strength and efficiency of banking system. In the literature, there are two main approaches to measure the market concentration and competition. From the structural approach, bank concentration and competition is measure by the number of banks, the market share of each banks... with the most popular method is Hirschman-

Herfindahl index (HHI). In the non-structural approach, different frameworks are developed with the most popular models are Iwata model (Iwata; 1974), Bresnahan and Lau model (Bresnahan and Lau; 1982) and Panzar-Rosses model (Panzar and Rosses; 1977, Panzar and Rosses; 1987).

This paper proceeds as follows: Section 2 will give a brief overview about Vietnamese banking system. Section 3 will provide some literature review about the market concentration and competition in banking sector. Section 4 will describe the data and methodology employing in this study. Section 5 will present and analyses the empirical result by both structural and non-structural approaches. Finally, the conclusion will be given in Section 6.

2. Overview of Vietnamese Banking system

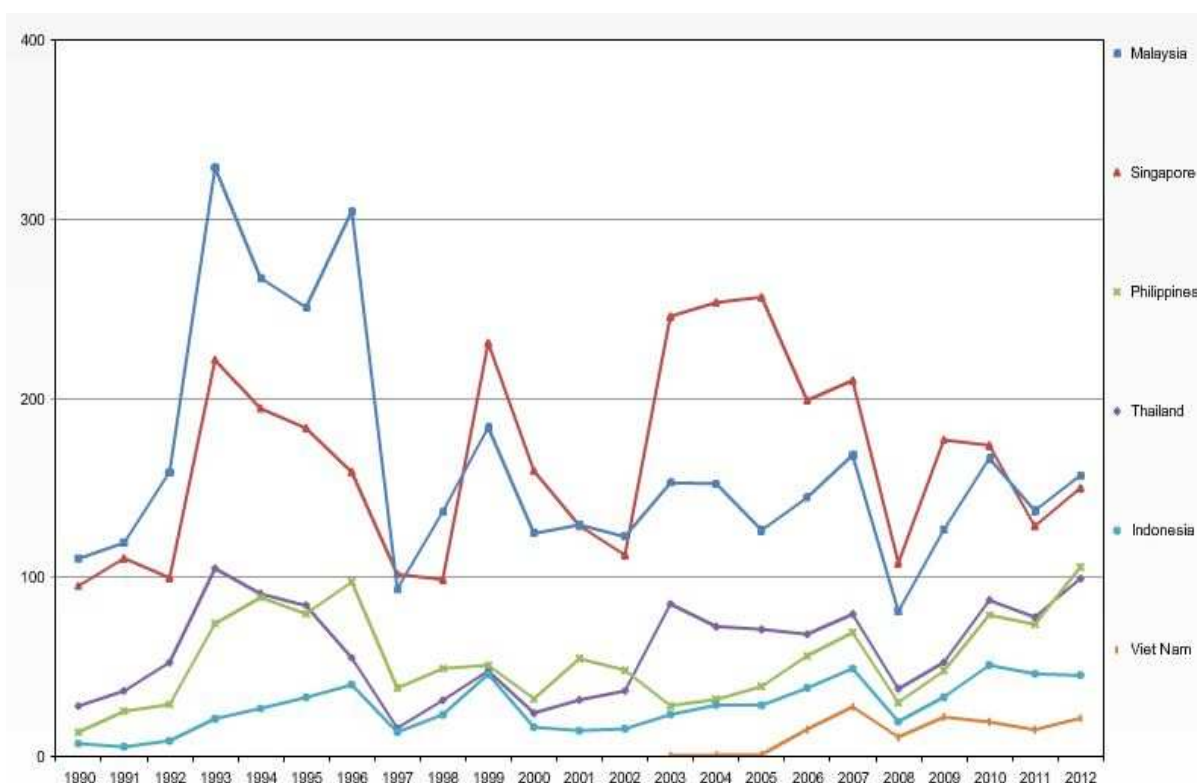
Early reform in Vietnamese banking sector was a part of the broader set of market-oriented reforms that the government began in the mid-1980s, focusing on decentralizing and privatizing financial services. Prior to 1990, the SBV operated as both central bank and commercial bank. It then separated its four main departments to form four newly SOCBs in 1990, each targeted to a different sector of economy. The central bank's industrial and commercial lending department converted to the Vietnam Industrial and Commercial Bank (Incombank – now is Vietinbank). The agricultural department was converted to The Vietnam Bank for Agricultural and Rural Development (Agribank), while its international trade department and infrastructure department converted to the Bank for Foreign Trade of Vietnam (Vietcombank) and the Bank for Investment and Development of Vietnam (BIDV), respectively.

Since the first reform, Vietnamese banking sector has playing a vital role in the economic development and growth. In 1992, domestic credit provided by banking sector accounted for only 15.7% of GDP, from this time onward, this ratio increased dramatically, peaking at 135.8% of GDP in 2011. Vietnamese stock market is still in early stage of development, as we can see in the Figure 1. The stock market capitalization only accounted for 21.1% of GDP in 2012, which has been announced to be increased to about 30% of GDP in 2013 recently. The size and the development of Vietnamese stock market is considerably much lower than that of neighbour countries, including Thailand, Singapore, Indonesia and Philippine, with the ratio came at over

100% of GDP in 2012. As a result, domestic credit provide by banking system is the main capital source for financing firms and the whole economy as well as the. Figure 2 provides a dramatic increasing trend in the ratio of domestic credit to the economy as a ratio of GDP. Although the credit growth of banking sector has slowed down in recent years due to the severe effects of global crisis, it is no doubt that banking sector will continue to contribute a large part in the development and growth of Vietnamese economy in the next few years.

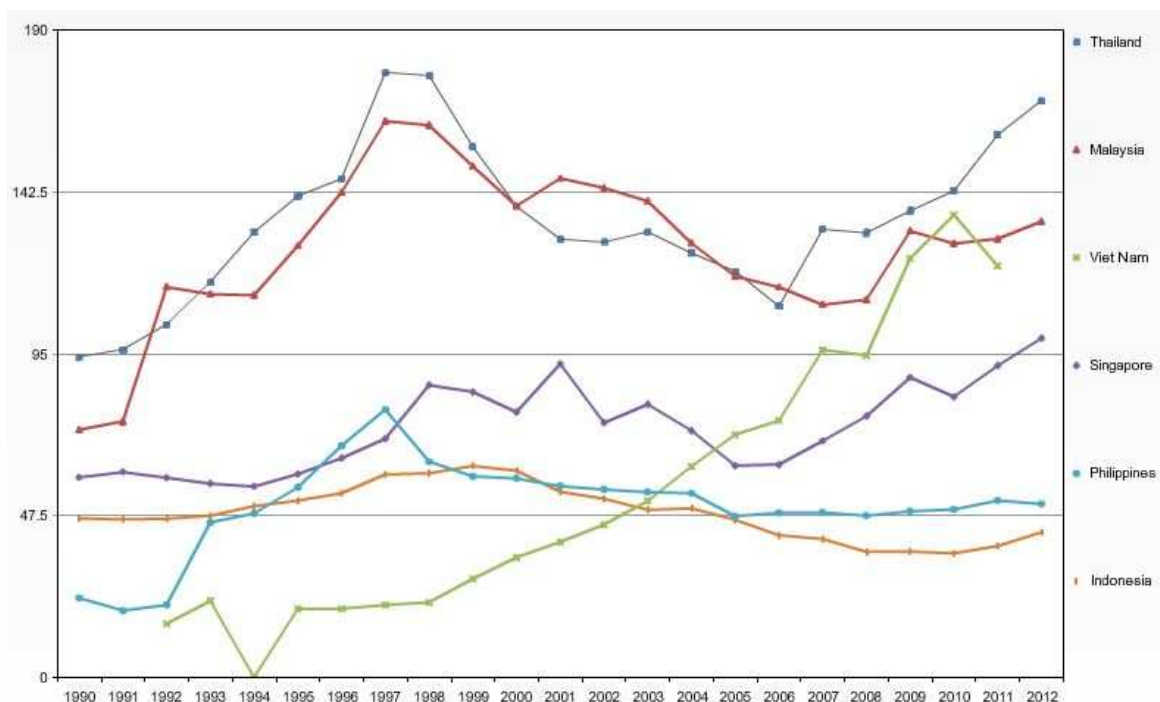
Additionally, Vietnamese banking sector has continued to widen financial assess to Vietnamese residents recently. Table 1 provides some brief statistics about the financial assess in Vietnam, collected from IMF data. The financial assess of Vietnamese banking sector has improved significantly in all indicators, highlighting the expansion of financial and banking services available to residents.

Figure 1. Stock market capitalization of Vietnam and other countries in ASEAN



(Source: World Bank Data)

Figure 2. Domestic credit provide by banking sector of Vietnam and other countries.



(Source: IMF data)

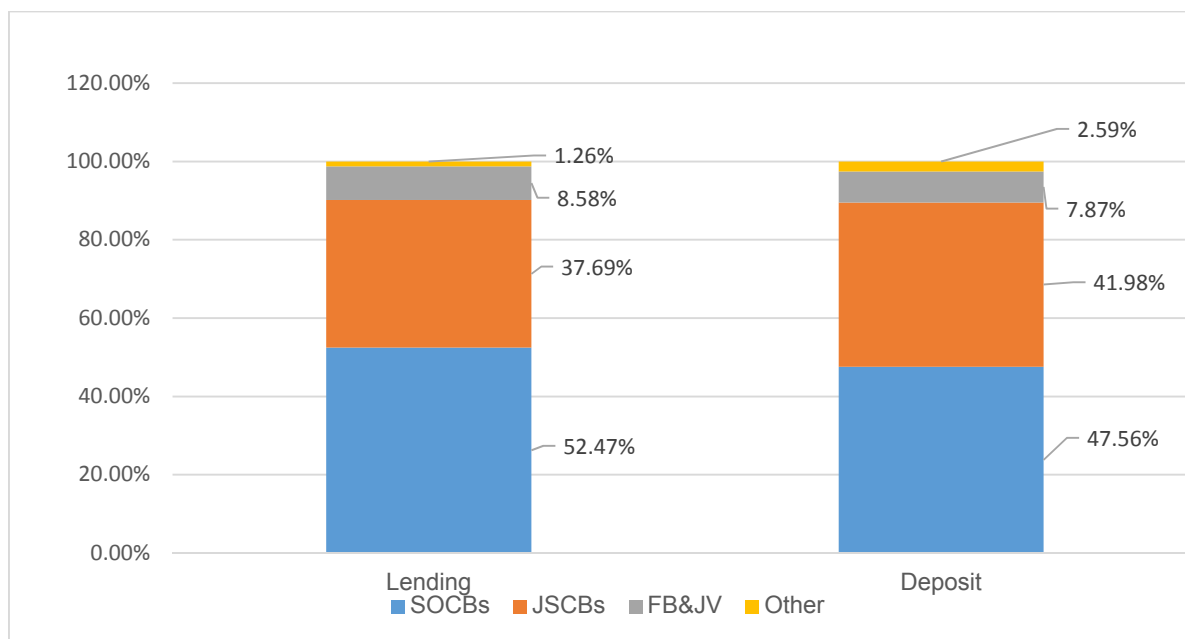
Table 1: Some brief statistic about financial assess of Vietnamese banking sector

Indicator/Year	2007	2008	2009	2010	2011	2012
Number of banks	85	94	94	101	100	100
Deposit with banks (% of GDP)	97.25	91.7	106.36	121.39	106.56	119.67
Commercial banks branches per 1000 km ²		6.83	6.98	6.98	7.77	6.91
Commercial banks branches per 100000 Adults		3.31	3.32	3.25	3.57	3.18
ATMs per 1000 km ²	15.52	24.74	31.38	36.87	43.05	46.02
ATMs per 100000 Adults	7.68	11.98	14.91	17.22	19.79	21.16

(Source: IMF data)

Vietnamese banking sector seems to have a high concentration with the dominance of SOCBs. 4 main state-owned commercial banks including Agribank, Vietcombank, Vietinbank, BIDV account for 38% of total chartered capital and 49% of total assets of the whole system. They are also dominate in both bank credit and deposit market as seen in Figure 3.

Figure 3: Market share by lending and deposit



(Source: IMF report)

However, the market concentration in banking sector is decreasing as a part of increasing Vietnam's entry to international trade and investments agreements, such as the US-Vietnam Bilateral Trade Agreement (BTA) in 2001, and the new role as an official member of the WTO in 2007. Since 2006, the State Bank of Vietnam (SBV) has granted licenses to five foreign banks to operate as wholly foreign-owned banks, as well as to six joint venture banks and over 50 subsidiaries of foreign banks. To adhere to WTO regulations, from January 1st, 2011, foreign banks and branches have received equal treatments as domestic banks. The increase presence of foreign banks and branches enhance the competitive pressure in banking sectors, forcing domestic banks to improve their competitiveness and strength.

Despite of significant expansion since 1990s, Vietnamese banking sector is still an infant industry with high potential growth. Only around 20% of the 90m population in Vietnam having bank account, as well as much lower financial assesses to banking services in compared with that of other ASEAN countries, shown in Table 2. In addition, with a young population and increasing imcome, the demand for modern banking services is expected to be increase substantially in the near future. Hence, together with unavoidable wave of financial liberalization and deregulation, Vietnamese banking sector will soon receive much higher interests and investments from foreigners and

global corporations, which in turn, will change the nature of market concentration and competition of banking sectors.

Table 2: Comparison of financial assess of Vietnam and other ASEAN countries.

	Vietnam	Thailand	Singapore	Indonesia	Malaysia
Commercial Bank Branches Per 1000Km ²	6.91	12.55	618.57	9.24	13
ATMs per 1000 km ²	46.02	89.7	3684.29	35.15	34.56
Commercial Bank Branches Per 100000 adults	3.18	11.77	9.76	9.59	19.91
ATMs per 100000 adults	21.16	84.16	58.12	36.47	52.94

(Source: IMF Data)

Since the global crisis recently, Vietnamese banking sector has exposed much weakness, slowing down the recovery of the whole economy. It is due to the fact that Vietnamese banking sector is out-banking in number, but under-banking in the services quality. Despite of a low average profitability in comparison sharply with other fields (ROE and ROA at 0.5% and 4%, respectively), bank profit is deteriorating recently as 24/125 credit institutions experienced losses, 100/125 gained but 57 of which had negative y-o-y profit growth (as in 30/6/2013). Bank credit growth continues to stay low, with some months being in negative growth, due to the weak domestic demand and high level of NPLs in the banking system. As a result, on March 01, 2012, the banking sector reform strategy was approved with the key objectives is to “restructure fundamentally and comprehensively the system of credit institutions to develop ... a modern, safe, sound efficient system compliant with international banking standards and practices”. One of key element of the plan to improve the competitiveness of domestic banks is restructuring weak institutions via mergers and acquisitions (M&A) deals, with the number of domestic banks being expected to decrease to about 15 to 17 units in 2017. Apparently, this restructuring progress will have significant impacts on the market concentration and competition of Vietnamese banking sector as well as the market behaviors of each commercial banks in the near future. Understanding the current state of market concentration and competition in banking sector could give some implications to Vietnamese government and SBVs in policy decisions to successfully implement the banking reform strategy.

3. *Literature review*

The competition in financial sector is important since it affects the efficiency of production of financial services, the quality of financial products and the degree of innovation in the sector. The degree of competition in financial sector can affect assess of firms and households to financial services which in turn influences overall economic growth. (Claessens et al – 2004). As in other industries, higher competitive nature in banking sector is expected to fuel the efficiency and maximize social welfare to the whole economy. However, banking industries have some special properties as well as high influence to other industries with its important intermediating role in capital allocation in the economy. As a result, there is a conventional debate among academicians about the economic role of market concentration and competition in banking sector to the financial stability and social welfare. This debate is getting more and more interests from policy makers as we have experience an avoidable wave of financial liberalization and deregulation, removing barriers to entry as well as protective policies for domestic institutions, which is expected to promote market competition in banking sector.

There are two main arguments in the theoretical literature about the economic role of market concentration and competition in banking sector. One argument based on the “*franchise value hypothesis*”, indicating that banking system could be more fragile and less stable resulting from higher market competition and lower market concentration. In the contrast, the second view based on “*risk shifting paradigm*” argue that financial stability would be enhance as the banking sector becomes more competitive.

Franchise value hypothesis focuses on the risk incentive of banks and analyses the effects of competition on bank’s risk taking behavior. It states that higher competition erodes profits margin causing banks’ franchise value drop, thus reducing incentives to prudential behaviour and leading to more aggressive risk taking in an attempt to earn higher profits. Banks may choosing more risky and lower quality portfolios, taking on more credit risk, lowering capital levels. It’s behavior, then, increase the probability of higher non-performing loan ratio and more bank bankruptcies resulting in greater fragility and financial instability. (Keeley, M.C – 1990; Beck – 2008, Jimenez, Saurina -2007). Boyd et al (2004) indicated that larger banks in a concentrated banking system

have higher profit, protecting them against financial shocks. The role of larger banks is also supported by the view of Boot and Thakor (2000) and Meon and Weill (2005), proposed that larger banks do not need to give credit to risky investors, and can therefore select their clients, which increase both return on investment and the soundness of the credit portfolio. They are also maybe better to diversify their loan-portfolio and geographical risk due to higher economic of scope and scale. Allen and Gale (2000) concluded banking sector with a few larger banks are easier to monitor than many smaller banks.

In the supporting view to bank competition, **risk-shifting paradigm**, argues that higher competition could contribute to financial stability as increase in market power and the resulting higher loan rates have the potential to negatively affect the stability of banks due to moral hazard and adverse selection on the part of borrowers as the borrower may choose higher risk project and increase their own risk of bankruptcy. This is, in turn, higher probability that loans turn non-performing, leading to higher bankruptcy risk for bank and greater financial instability (Boyd and De Nicolo -2006). Mishkin (1999) also indicated the “*too-big-to-fail*” problem in bankings sector as a result of lessening the degree of competition. He stated that larger banks are more likely to receive public support, and this worsen the moral hazard problems as larger banks may take more risky investment under a government safety net. Berger et al (2008) also shared this view, indicated that policy-makers are more concern about bank failures in more concentrated banking sectors with few large banks. Concern about contagion and financial crisis resulting from the failure of larges banks make regulators reluctant to let them fail in the event of solvent problem. As a result, in highly concentrated markets, financial institutions may believe they are “too big to fail” and this may lead to riskier investments. He also added that larger banks have more complex organisational structure and may be associated with lowere transparency, which make them more difficult to monior. In according to the social welfare, Noland (1996) pointed out that creation of a competitive environment encourages financial firms to adopt cost-reducing measures and use resource more efficiency. In a competitive environment, financial firms are forced to increase the quality of service such as faster clearing of payments, more rapid processing of loan applications, and extended working hours for customers.

Similar to theoretical literature, large empirical were conducted to examine the impact of banking system structure on the stability and efficiency of banking sector. They are all found different results and do not offer concrete evidences. The approaches of measuring concentration and competition in banking sector could be divided into two main lines: structural and non-structural method.

Structural approach based on the traditional industrial organization literature includes Structure-Conduct-Performance paradigm (SCP) and Efficiency Structure Hypothesis: *SCP* paradigm links between structure and performance of industries. Structure accounts for degree of concentration in the market. Conducts refers to the behavior of firms in setting pricing, making research and development... Performance refers to efficiency of firms, defined by the market power, with greater market power implying lower efficiency. The paradigm is based on the hypotheses that structure influences conducts (lower concentration leads to more competitive behavior of firms); conducts influences performance (more competitive behavior leads to less market power, then greater efficiency) and structure therefore influence performance (lower concentration leads to lower market power and then greater efficiency). As a result, competition in the sector could be measured by the degree of concentration. One of the most popular approach is the use of Herfindahl – Hirschman Index. *Efficiency Structure Hypothesis (EH)*, argued by Demsetz (1973) and Peltzman (1977), state that efficient firms increase in size end, therefore, in market share due to their ability to generate higher profits, leading to higher market concentration. Under EH, their no direct relationship between market concentration and competition, and the highly concentrated sector is the logical outcome of market forces.

In contrast with structural approach, non-structural approach measure the competition directly. Two most approaches are the model developed by Panzar and Rosse (1987) and Bresnahan (1989). While Bresnahan (1989) used the condition of General Market Equilibrium with the basic idea is profit-maximizing firms in equilibrium will choose prices and quantities such that marginal costs equal marginal revenue, which coincides with the demand price under perfect competition or with the industrial marginal revenue under perfect collusion. Panzar and Rosse (1987) uses bank level data and investigates the extent to which a change in factor input prices is reflected in revenues earned by a specific bank. In other words, the competition in a sector is measured by the elasticity of

output revenue due to changes in input prices. Under perfect competition, an increase in input prices raises both marginal costs and total revenues by the same amount as the rise in costs. Under a monopoly, an increase in input prices will increase marginal costs, reduce equilibrium output and, consequently, reduce total revenues.

A number of papers have applied both structural and non-structural approaches to investigate the degree of concentration and competition as well as the impact of market concentration and competition in banking sector in developed countries but just a few of them targeted on developing countries.

For instance, Bikker and Groeneveld (2000) investigated a sample of European countries between 1989 and 1996 and did not find evidence of increasing competition during this period. Bikker and Haaf (2002) then extend the analysis to 23 OECD countries over the period 1988 to 1998. For every single country, results describe a monopolistic competition environment. They then divide sample banks to large, medium and small-size banks and found that competition appears to be stronger to large banks and weaker to small banks.

Claessens and Laeven (2004) explored a multi-country analysis of banking competition with the largest bank data by computing H-statistic for 50 developed and developing countries for the period 1994 – 2001. They found a monopolistic competition in the banking sectors of all countries under consideration. They are then regressing the estimated H-statistic on a number of country-specific characteristics with the presence of foreign banks, activity restrictions, entry regime, market structure and some general macroeconomic conditions being under review. They do not find a clear relationship between competition and concentration, but did find that fewer entry and activity restrictions result in more competition.

Weil (2004) measures the banking competition for a sample of 12 EU countries over the period from 1994 – 1999 and found that there is a decreasing pattern of monopolistic competition. He then explored the relationship between competition and efficiency measured by efficiency scores being estimated using a stochastic frontier approach, together with a set of macro factors and geographical dummies. He found that the relationship between competition and efficiency tends to be negative. This result was supported with the research of Casu and Girardone (2006) on a sample containing 15

EU members' countries. The only difference was that Casu and Girardone estimate the efficiency of banks by efficiency scores conducted by a non-parametric Data Envelopment Analysis.

In term of developing countries, Perera et al (2006), by applying Panzar and Rosse test, found a monopolistic competition in banking sector of South Asian banking sector during the period 1995 to 2003. They also compared the competition in traditional market-based products market and fee and commission based products markets. Under their investigation, Bangladesh and Pakistan had more competitive nature in traditional market-based products markets, while Indian and Sri Lankan competition was greater in fee and commission based products market.

Gelos and Roldos (2002) concerned about the market structure in emerging markets banking systems and found that market competition in banking sector was not decrease due to a significant process of bank merger and acquisition wave during 1990s. They also suggested that lowering barriers to entry have prevent a decline in competitive pressures.

In their research on the market concentration and competition in Nepalese banking sector, Gajuel and Pradham (2012) found a decreasing trend and low level of market concentration in the period of 2001 – 2009. They also indicated more competition in interest-based market than fee-based market.

In my knowledge, the market competition and concentration in Vietnamese banking system have not been investigated fully. Vietnamese banking system competition was only a part of data in the research of some academicians for multi-country sample, such as Bikker et al (2009) and Sentiyono and Tarazi (2014). As a result, this study could be the first research employs both structural and non-structural approaches to investigate the degree on concentration and competition in Vietnamese banking sector. The results of this study could give some policy implications in the hope of strengthen the strength and competitiveness of Vietnamese commercial banks.

4. Data and Methodology

4.1. Data

The main data employed in this study was collected from bank database of Bankscope by Bureau van Dijk. It includes annual bank level data of all Vietnamese commercial

banks during the period from 2004 to 2013 due to the availability of data, except for Vietnamese Bank for Social Polices and The Vietnam Development Bank for clear representation of commercial bank behaviors in conducts and performance. The data for foreign banks' branches and subsidiaries are also dropped from the sample as their behavior and performance mainly contributed to their foreign parent bank. Hence, the minimum data available is only 10 banks in 2004 to 34 banks in 2012 maximum, resulting to an unbalanced data with the total bank year observation accounting to 224. The commercial banks sample consists of both state-owned banks, joint-stock banks and whole foreign-owned banks, hence, it is expected to represent all features of Vietnamese banking sector. The data also concerned about the ownership of commercial banks as well as whether they have foreign involvement in operation, either as an owner or an investor, in order to investigate different competitiveness of different type of commercial banks under consideration.

4.2. Methodology

4.2.1. Structural approach

Under structural approach, the market concentration and competition in banking sector is measured by the “*k-bank*” concentration ratio, and more intuitive Herfindahl-Hirschman Index (HHI-index).

The “*k-bank*” concentration ratio is measure by the sum of market share of *k* largest banks in the sector. The higher the ratio, the more concentration in the banking sector with larger market power to largest banks in the banking sector.

$$CR_k = \sum_i^K MS_i$$

On the other hand, HHI-index is calculated by squaring the market share of each banks competing in the banking sector. The HHI – index is express as follow:

$$HHI = \sum_{i=1}^N MS_i^2$$

The higher the ratio, the higher degree of concentration, and therefore lower competition in the banking sector. The US Merger Guidelines pointed out that a HHI – index below 0.01 indicating a highly competitive market, a HHI – index of between 0.01 and 0.1

belongs to un-concentrated market, a HHI – index ranged from 0.1 to 0.18 indicates moderate concentration while HHI – index above 0.18 comes from highly concentrated banking sector.

4.2.2. Non-structure approach.

This research applies the reduced-form revenue equation specified by Panzar and Rosse (1987), which is one of the most widely used to discriminate between oligopolistic, monopolistically competitive and perfectly competitive markets. The methodology of Panzar – Rosse method base on the general equilibrium market theory. Assuming long-run market equilibrium, individual firms will decide their productions in quantity and prices by setting marginal revenue equals to marginal costs.

$$R_i^m(y_i^*; Z_i^R) = C_i^m(y_i^*; W_i; Z_i^C)$$

Where $R_i(\cdot)$ and $C_i(\cdot)$ are the revenue and cost functions of bank i , y_i is the output of firm, W_i is the K -dimension vector of factor input prices of bank i , $W_i = (w_{1i}; w_{2i}; \dots; w_{ki})$; Z_i^R is a vector of exogenous factors affecting the revenue function, Z_i^C is a vector of exogenous factors that shift the cost function.

Panzar – Rosses approach measure the degree of competition though H – statistic, evaluate the elasticity of total revenues with respect to changes in the factor input prices.

$$H = \sum_{k=1}^K \left(\frac{\partial R_i^*}{\partial w_{ki}} * \frac{w_{ki}}{R_i^*} \right)$$

The empirical application of Panzar and Rosse approach assumes log-linearity in the specification of the revenue and cost equation. The reduced-form of revenue equation is:

$$\ln(R_i^*) = \alpha + \sum_{k=1}^K \beta_k \ln(w_{ki}) + \sum_{q=1}^Q \delta_q \ln(z_{qi})$$

Where Z_i is a vector of Q bank-specific variables, w_{ki} is k input factor prices. Then H – statistic is calculated by

$$H = \sum_{k=1}^K \beta_k$$

The H – statistic, then, will indicate the overall level of competition in the market under consideration. According to Panzar and Rosse, H – statistic value ranges from minus infinity to unity. Under perfect competition, H – statistic takes unity value that means 1 percent change in cost will lead to 1 percent change in revenues. Under monopoly market structure, H – statistic will take value from minus infinity to zero, meaning 1 percent change in cost will lead to a fall in revenue. H – statistic value ranges from zero to unity will indicate a monopolistic competition in the market, with higher H – value indicate higher competition.

P – R approach assumes market equilibrium, hence, a test for long – run equilibrium is required with ROE or ROA is used as a dependent variable. The same H – statistic value will be recalculated and it is supposed to be significant equal to zero in equilibrium and significant negative in disequilibrium. This is based on the view that in equilibrium, rate of return do not depend on the level of input prices.

5. Empirical results

5.1. Structural approach

The structural approach in measuring market concentration and competition in Vietnamese banking sector is taken by the concentration ratio of four and six largest banks in the industry as well as HHI – index, both in term of total asset, deposit market and loan market, for three years including 2007, 2009 and 2012. Table 3 below summarizes these concentration ratios in Vietnamese banking sector, including CR4, CR6 and HHI – index.

Table 3: Vietnamese bank concentration ratios

	2007			2009			2012		
	<i>Assets</i>	<i>Deposit</i>	<i>Loan</i>	<i>Assets</i>	<i>Deposit</i>	<i>Loan</i>	<i>Assets</i>	<i>Deposit</i>	<i>Loan</i>
CR4	66.70%	73.07%	71.70%	53.84%	58.21%	62.84%	49.53%	52.6%	59.91%
CR6	77.95%	81.41%	83.04%	65.36%	68.55%	71.53%	58.26%	61.9%	68.33%
HHI	0.130	0.149	0.166	0.093	0.107	0.124	0.077	0.087	0.106

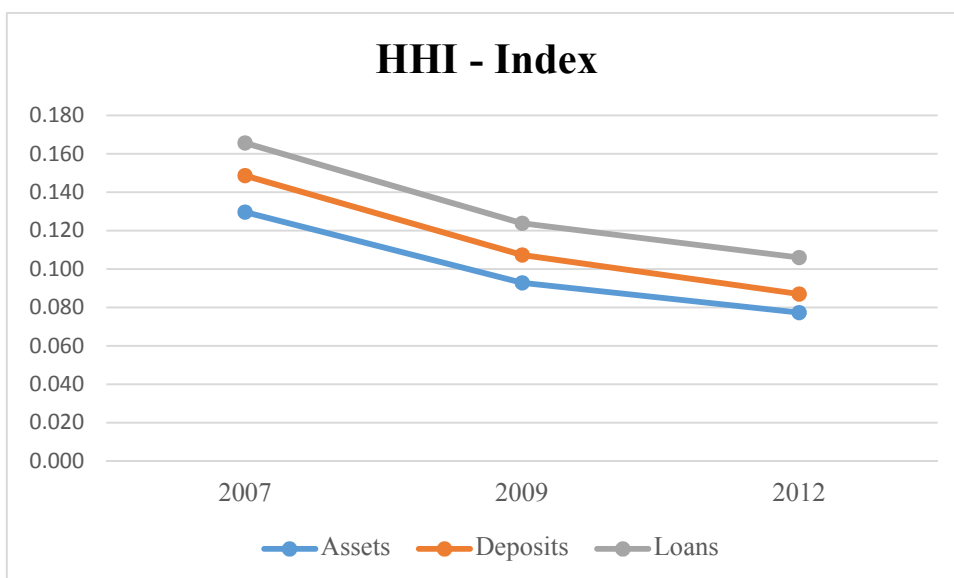
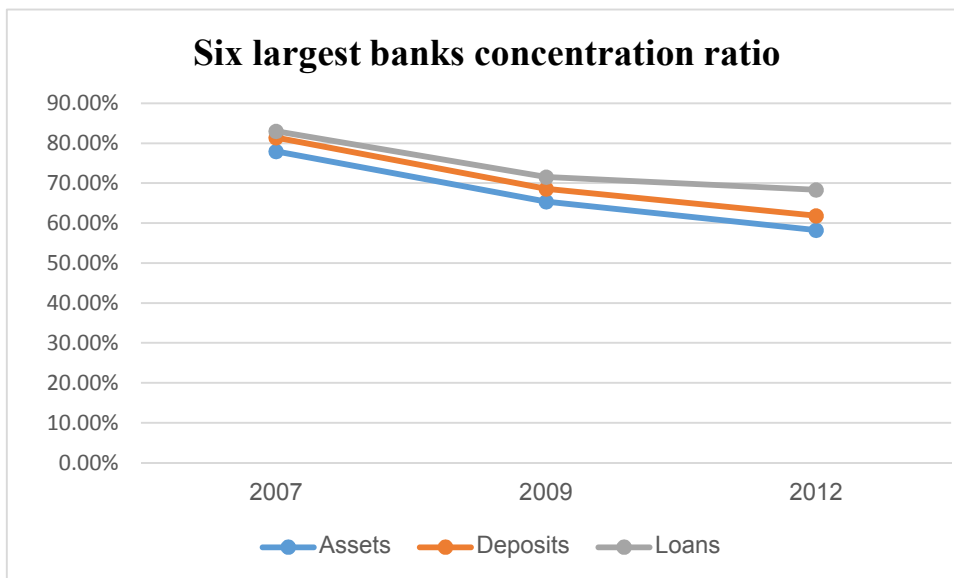
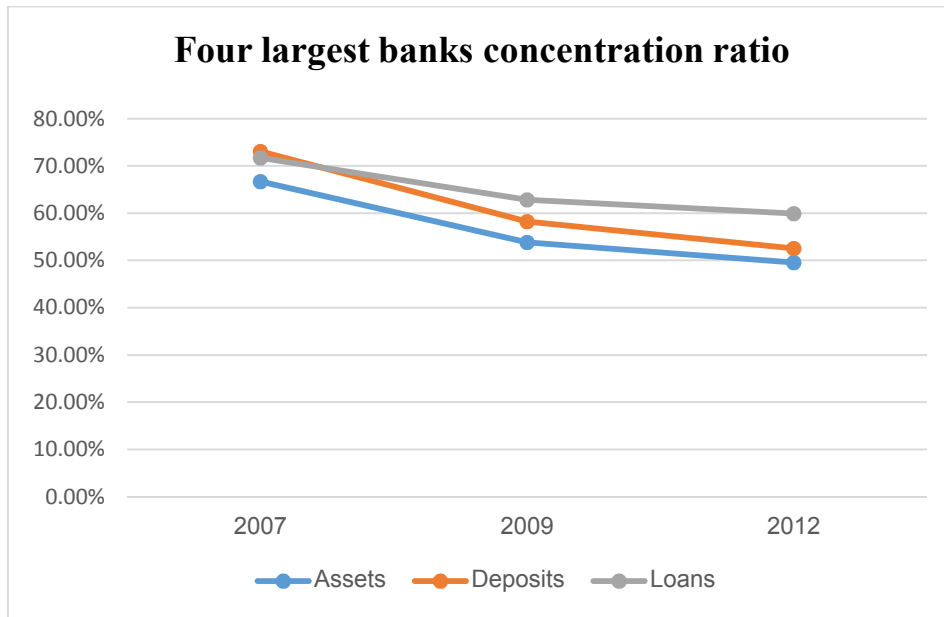
As we may expected, Vietnamese banking sector is denominated by four state-owned commercial banks, which are also four largest banks in the industry both in term of assets, deposit and loan markets. However, there is a clear decreasing trend in both total assets, loan and deposit markets. Theirs' assets accounted for 66.7% of the whole banking sector's total assets in 2007 before being dropped considerably to 53.84% in

2009 and slightly below 50% in 2012. It could be due to the fact that their assets had to be increased as all Vietnamese commercial banks had to meet the capital requirement of at least VND 3 trillion by 31/12/2010, required by Decree 141/2006/NDD-CP by the Government on 22/11/2006. Similarly, this trend is also the same in deposit and loan markets, with the ratio CR4 decreasing from 73.07% in 2007 to 52.6% in 2012 and 71.7% to 59.91%, respectively. When we added 02 largest commercial banks to calculate CR6 ratio, the result was absolutely the same. The significant decrease in the market share of four largest banks and six largest banks suggests the changing in the market structure in Vietnamese banking sector to a more competitive nature. Interestingly, the concentration in loan market decreased with a faster pace than that of total asset and deposit market.

The main drawback of using “*k largest banks*” ratio is that it does not account for the number of banks in the market although it could give a direct indication to measure the concentration and competition in the industry. Herfindahl-Hirschman Index is usually used to overcome this disadvantage. The changes in value of HHI in term of total asset, deposit and loan markets confirm a decreasing trend in market concentration and increasing competitive nature in Vietnamese banking sector. HHI – index changed from a moderate competitive nature, with 0.13 in total assets, 0.149 in deposit and 0.166 in loan markets respectively, to an un-concentrated market in 2012, with the value coming to only 0.077; 0.087; 0.106, respectively.

To sum up, all these ratios suggested a decreasing trend in the concentration of Vietnamese banking sector as a result of financial liberalization, deregulation and loosening entry to foreign banks due to wider access of the country to global trade. One of the striking feature is that loan market seem to have higher competitive nature in compared with deposit market. It could be due to the fact that domestic credit from banking sector contribute the largest part to economic development and growth, while Vietnamese people still have low access to banking services, particularly in deposit products, as only about 20% of Vietnamese population having bank accounts. Figure 4 captures the trend of lower concentration and higher competitive nature in Vietnamese banking sector via CR4; CR6 and HHI – index ratio.

Figure 4 Changes in concentration and competition in Vietnamese banking sector.



5.2. Non-structural Approach

This research employs the revenue reduced-form model to conduct H – statistic by Panzar – Rosse approach that is usually used in previous empirical researches. As suggested in literature, all these variables should be used in natural logarithm form.

$$\ln(NITA_{it}) = \beta_1 + \beta_2 PF_{it} + \beta_3 PL_{it} + \beta_4 PK_{it} + \sum_{j=5} \beta_j BSF_{it} + \varepsilon_{it} \quad (1)$$

Where

$NITA_{it}$ is the ratio of net interest revenue to total assets as the dependent variable

PF_{it} is the ratio of total interest expense to total loanable funds

PL_{it} is the ratio of total personal expense to total asset

PK_{it} is the ratio of total operating expense to total asset

BSF_{it} is the set of bank specific factors that could affect the performance of a commercial bank

The subscript i represents the bank i and the subscript t denotes the time period t .

The H – statistic at time t is calculated as

$$H_t = \beta_{1t} + \beta_{2t} + \beta_{3t}$$

The choosing of variables in this research followed the model suggested by Claessens and Laeven (2003). The main reason of choosing $NITA_{it}$ is the dependent variable, representing the output price in revenue reduced-form model, is due to the fact that the interest-based products is the core function of a commercial banks, especially in Vietnam.

In term of inputs used by banks, there is a common agreement between literature with three main inputs, namely loanable funds (refers to deposit and loans in wholesale market); labor and physical capital (fix assets), following Rozas (2007); Claessens and Laeven (2003); Sufian and Habibullah (2013)... PF_{it} refers to the cost of loanable funds, proxy by the ratio of total interest expense to total loanable funds. PL_{it} refers to the cost of labors, representing by the ratio of personal expense to total assets while the ratio of total operating expense to total assets is used as proxy for the cost of physical capital, PK_{it} .

Some bank specific factors are included in the model to capture the difference between characteristics of each bank in the sample, including CAP_{it} (the ratio of total equity to total assets); $LOAN_{it}$ (The ratio of net loan to total assets) and ASS_{it} (Total assets). The ratio of total equity to total assets is used to capture the difference between capital structures of banks. The ratio of net loan to total assets used for measurement of elasticity of banks toward loans financing, while total assets is used as a proxy of bank economic of scope.

However, as Panzar – Rosse approach bases on the assumption that the market is under long-run equilibrium, hence, we also estimate the following equation to test whether Vietnamese banking system is under equilibrium as suggested in the literature.

$$\ln(ROA_{it}) = \alpha_1 + \alpha_2 PF_{it} + \alpha_3 PL_{it} + \alpha_4 PK_{it} + \sum_{j=5} \alpha_j BSF_{it} + \varepsilon_{it} \quad (2)$$

In the equilibrium test, ROA_{it} is used as the dependence variable instead of $NITA_{it}$ as suggested by Rozas (2007); Claessens and Laeven (2003), Shaffer (1982) or Bikker and Haaf (2002). We will test the whether $E = 0$ using a F-test with

$$E_t = \alpha_{1t} + \alpha_{2t} + \alpha_{3t}$$

If we reject the hypothesis of $E = 0$; then the banking sector is not under equilibrium, hence, using H – statistic to measure the concentration and competition of Vietnamese banking sector is not no longer suitable. The idea behind this test is that under equilibrium, returns on bank assets should not be related on input prices.

Table 4: Summary statistic of all variables

	NITA	PF	PL	PK	LOAN	CAP	ASS	ROA
<i>Mean</i>	3.148371	7.167903	0.722075	0.858705	50.67881	11.7789	112783.5	1.313317
<i>Median</i>	3.1105	7.05	0.674473	0.747599	52.327	9.1025	56880.02	1.338
<i>Maximum</i>	7.259	14.71	1.93752	4.926743	84.477	94.286	1212403	6.403
<i>Minimum</i>	-0.193	1.12	0.043764	0.06558	2.48	1.08	226.1568	-5.993
<i>Std. Dev.</i>	1.061202	2.450226	0.32038	0.459419	18.49874	10.78547	155621.6	0.978742

There is a significant difference between mean and median value, especially in ASS_{it} ratio, revealing a high concentration in Vietnamese banking system with the dominance of state-owned commercial banks. One striking feature in the summary statistic table is huge gaps between maximum and minimum value in each variable together with high standard deviation that could result from high competitiveness in the banking sector.

The earlier empirical researches tended to use a Pooled Ordinary Least Square method to estimate the H – statistic. However, this method could give a “*biased and inefficient parameter estimates as well as inaccurate standard errors*” (Kollmeyer, 2009), leading to heterogeneity bias, especially with an unbalanced panel data as used in this research. Hence, there are two popular panel estimator approaches usually used to overcome these limits, namely fixed-effect and random-effect models. In order to produce stable results, the model is firstly tested by F – test and LM – test (Breusch and Pagan Lagrangian Multiplier test) to decide whether Pooled OLS or fixed effect and random effect method could give better results, respectively. The results suggest that both fixed-effect and random-effect models would provide more stable results than that of Pooled OLS.

The next step is deciding whether fixed-effects model could be more appropriate than random-effects model or vice versa. Hausman test is used with the null hypothesis in favor of using random – effects and the alternatives supports fixed – effects approach for estimations. The p – value of 0.1018 in result table (see Appendix) indicates that we cannot reject the null hypothesis at 10 percent of significance, hence, we should go with random – effects model in this research. Finally, as the panel data used in this paper is a short panel data, hence, a “*within*” random – effect to explore difference in error variance components across time-period is considered.

The equation (2) is estimated firstly in order to test for market equilibrium required assumptions to use Panzar – Rosse method. Table 5 give a short result, using Wald test with the null hypothesis being market equilibrium ($E = 0$). The value of both F – statistic and Chi-square value failed to reject the null hypothesis, hence, we could use Panzar – Rosse approach to estimate the concentration and competition of Vietnamese banking sector appropriately.

Table 5: Equilibrium test result

Wald Test:
Equation: Equilibrium test

Test Statistic	Value	df	Probability
F-statistic	1.390236	(1, 168)	0.24
Chi-square	1.390236	1	0.2384

Finally, Table 6 below shows the results of equation (1) estimations using “*within*” random – effects models for the whole samples and four sub-samples concerning state-owned feature and foreign-owned feature.

Table 6: Result output

Variable	Overall	State-owned feature		Whole foreign-owned feature	
		State-owned banks	Joint-stock banks	Domestic banks	Foreign banks
Constant	0.582957 (-1.506678)	1.273779 (1.201556)	0.825657* (1.792558)	1.36585*** (3.224943)	-1.731737*** (-3.969901)
lnPF	-0.173652*** (-2.70297)	0.282036** (2.061729)	-0.179307** (-2.469979)	-0.307278*** (-3.845358)	0.066052 (1.297268)
lnPL	0.325263*** (5.300601)	0.189031** (2.159762)	0.324523*** (3.890277)	0.388387*** (5.424917)	-0.151444 (-1.51058)
lnPK	0.107561 (1.485205)	-0.069673 (-0.602042)	0.134813 (1.570821)	0.054114 (0.682795)	0.387355*** (3.999428)
lnCAP	0.053321*** (4.320089)	-0.172534** (-2.161917)	0.236272*** (3.600346)	0.157837** (2.47875)	0.470507*** (8.484036)
lnASS	0.048753** (2.264953)	0.084972 (1.458519)	0.02595 (0.955573)	0.013697 (0.595581)	0.065797* (2.000372)
lnLOAN	-0.009399 (-0.247538)	-0.33437 (-1.383279)	-0.013639 (-0.326311)	0.000343 (0.008215)	0.252289*** (3.963006)
Adjusted R-square	0.358254	0.573905	0.365683	0.287346	0.780673
F - statistic	18.1196	9.081361	15.12421	11.81932	13.45794
H - statistic	0.259172	0.401394	0.280029	0.135223	0.301963
Wald test (H=0)	12.73942	10.95635	10.04946	2.911799	13.53325
(p - value)	0.0000	0.0024	0.0019	0.0899	0.0022
Wald test (H=1)	104.0904	24.36696	66.4302	119.0883	72.3195
(p - value)	0.0000	0.0000	0.0000	0.0000	0.0000
Test result	Monopolistic competition	Monopolistic competition		Monopolistic competition	
Observation	185	37	148	162	23

NOTE: All regressions are estimated using “*within*” random-effects models to calculate H - statistic as used under Panzar - Rosse approach. Significant level at *10; **5 and ***1 percent level. The value in parenthesis are t-statistic and were calculated using White's correction for heteroscedasticity. The Wald test is used to test the H = 0 and H = 1 null hypothesis and follows an F - distribution.

(Source: Result output from Eview 6 software)

The H – statistic in overall model and both four sub-samples take values between 0 and 1, indicating a monopolistic competitive nature in Vietnamese banking sector. The null hypothesis of monopoly competitive nature (H = 0) and perfect competition in banking sector (H = 1) tested by Wald test are rejected with statistically significance, except a highly significance level for the competition between domestic commercial banks. Hence, if everything is holding constant, empirical findings suggest that Vietnamese commercial banks are competing in a monopolistic competitive nature.

It is worth noting that the higher the H – statistic, the higher degree of competition in the sector. The H – statistic for overall sample is as 0.259172, reconfirming the findings of high concentration and low competition in Vietnamese banking sector in structural approach via HHI – index. Additionally, state-owned commercial banks are competing more intensively in compared with joint-stock commercial banks while whole foreign banks compete harder than that of domestic banks.

One of striking feature of H-statistic value is that it reveals, to some extents, the degree of competitiveness of a commercial banks as it measure the elasticity of total interest revenue due to changes in input prices. Hence, the higher the H – statistic, the more competitiveness ability of banks as it could turn 1 percent of increase in input prices to a higher degree of total revenue. Hence, in state-owned feature of banks, state-owned banks have much higher competitiveness in compared with joint-stock commercial banks. This is an unsurprising results as state-owned banks have much more comparative advantages than that of joint-stock commercial banks such as economic of scope and scale, higher supports from central banks and governments, wider branches networks, longer operational time with better customer bases... In term of foreign-owned feature, whole foreign-owned commercial banks seem to have higher competitive behaviors than domestic competitors. This could due to the fact that Vietnamese domestic banks are still in early stage of development as most of them have been operating for about 20 years since 1990.

The signs of the coefficients of cost of loanable funds PF_{it} ; cost of labor PL_{it} and cost of physical capital PK_{it} give implications about the impacts of input prices to the total revenue of banks. An increase in the cost of loanable funds tend to reduce the total revenues of banks, except for the case of state-owned banks. The cost of loanable funds actually have positive effects on total revenue of state-owned banks as they have more comparative advantages in raising deposits and wholesale funding due to their economic of scope and scale together with better consumer base than their competitors. The cost of labor have positive signs in all the models, implying that an increase in the cost of labor could lead to higher total revenue with statistically significant level. In the contrast, only in foreign-owned banks, cost of physical capital have significantly positive impacts on the total revenue. It could due to the fact that operating cost could contribute a large

part to the performance of foreign-owned banks as they should have to pay higher initial cost in the new market.

Turning to the impacts of bank specific factors, only the capital structure of banks could influence the total revenue of banks with positive signs in almost all models, except for the case of state-owned banks. It support the better capitalization leads to lower costs of going bankruptcy, thus reduce the cost of funding overall. In the case of state-owned banks, the negative sign of coefficient could results from the increase of opportunity costs as they already have better capitalization and lower bankruptcy cost in compared with joint-stock banks. The positive sign of $\ln ASS_{it}$ in overall model confirm the existence of economic of scope and scale in Vietnamese banking sector while only foreign-owned banks expect a rise in their ratio of loans to total assets as it could be a signal of higher market penetration in host country.

In the comparison with the H – statistic of other Asia countries collected from the work of Setiyono and Tarazi (2014), provided by table 7, Vietnamese banking sector seems to have lower level of competition in the banking sector as well as lower level of competitiveness of commercial banks. This could be a disadvantage of Vietnamese commercial banks in the international competition of financial and banking services, especially in the unavoidable wave of financial liberalization.

Table 7: H – statistic of some Asia countries.

Nation	China	Hongkong	Indonesia	Malaysia	Philippines	Singapore	Thailand	Average Asia
H-statistic	0.324	0.508	0.462	0.441	0.614	0.673	0.349	0.361

6. Conclusion

Vietnamese banking system is under a large reforms and restructuring progress to create a safe and sound efficient system and improve the efficiency of commercial banks. Enhancing competitiveness and strength of domestic commercial banks is an important and key missions of policy makers and supervisors to face with unavoidable globalization in financial and banking services market. Obviously, understanding the current state of competitive nature in banking sector is the first task.

Empirical findings in both structural and non-structural approaches reveals that Vietnamese banking sector is under monopolistic competitive nature, but still close to

the monopoly market with high concentration and low competitive. Fortunately, the competition is tend to increase recently, thanks to the higher assess of the economy to the international field with lower entry to foreign institutions and lower protective policies toward domestic banks. Additionally, the equilibrium test indicate that the industry is in equilibrium.

Stated-owned commercial banks and whole foreign-owned banks have better competitiveness in compared with their competitors, joint-stock commercial banks and domestic banks. The effect of cost of loanable fund and total asset to total revenues suggest the existence of economic of scope and scale in Vietnamese banking system while an increase in the capitalization of joint-stock banks could improve their competitiveness and total revenue.

To sum up, as indicated by H – statistic and HHI – index, Vietnamese banking sector still have much room for improvement in the competitive nature as we still have low competition in compared with that of other Asians. The regulators should continue recent financial liberalization in financial and banking services markets to further improve the competitive market behaviour among commercial banks.

APPENDIX

Table 1: F - test for Fixed - effect

Redundant Fixed Effects Tests			
Equation: EQ03			
Test period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Period F	3.303912	-9,169	0.001
Period Chi-square	29.983801	9	0.0004

Table 2: Breusch and Pagan Lagrangian Multiplier test for random effect

Breusch and Pagan Lagrangian Multiplier test for random effects		
lnNITAit[Year,t] = Xb + u[Year] + e[Year,t]		
Estimate result		
	Var	sd=sqrt(Var)
lnNITAit	0.132301	0.363732
e	0.078721	0.2805733
u	0.007844	0.0885633
Test	Var(u) = 0	
	chibar2(01) = 6.76	
	Prob>chibar2 = 0.0047	

Table 3: Hausman test for Random effect and Fixed effect

Correlated Random Effects - Hausman Test			
Equation: EQ02			
Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	10.592843	6	0.1018

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