COMPETITIVE CONDITIONS IN BANKING INDUSTRY: AN EMPIRICAL ANALYSIS OF THE CONSOLIDATION, COMPETITION AND CONCENTRATION IN THE INDONESIA BANKING INDUSTRY BETWEEN 2001 AND 2009

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Abstract

Few large banks dominate the Indonesia banking industri. Furthermore, in the past ten years, there were a series of mergers and acquisitions in the banking market. The facts cause implications on competition. In this paper, we examine these issues exploiting an unconsolidated annual financial report of all commercial banks between 2001 and 2009. The Panzar-Rose method is employed to examine the banks behavior in competition. Estimates indicate that banks in all three subsamples, large; medium-sized and small are working in a monopolistically competitive market. The analysis of market concentration supports the conventional view that concentration impairs competition. The study shows that the most competitive market was the medium-sized banks because it was least concentrated. In contrast, the large market was more concentrated thus it was less competitive. The consolidation policies driven by the Central Bank reduced market concentration because mergers and acquisitions were mostly conducted by the medium-sized and small banks. Further the improvement of market share distribution and the increasing capacity of the merging banks enhanced competition in the Indonesia banking industry.

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I. INTRODUCTION

The Indonesia banking industry experienced a structural change in 1990 where the number of banks increased significantly. The change in market structure was promoted by the deregulation policy in the banking sector in 1980s. Through the second deregulation in October 1988 the government removed barriers to entry to the banking sector. The minimum capital requirement was lowered and it was easier for banks to obtain licenses to undertake foreign exchange operations (McLeod, 1999). In addition, if the license was obtained, all branches were automatically eligible to provide foreign exchange services.

Table 1. The Microeconomic Policies in Indonesia Banking 1983 - 1997	
Y e a r	**Policy Details**
Deregulation	
June 1983	Removing the control on the interest rates of time deposits of State Owned Banks and the lending of all banks.
October 1988	1. Opening the banking industry to the new private banks and the new joint venture banks by lowering minimum capital requirement. 2. Removing business restrictions such as easing requirement of the existing banks to expand their branch easily; limit on interbank borrowing and permitting banks to introduce savings deposits product of their own design.
February 1992	1. Opening the market by permitting foreign investors to purchase shares in domestic banks listed on the stock exchange 2. Partial privatizing by permitting State Owned Banks to list on capital market
Re-Regulation	
1995-1997	1. Re-imposing the controls of bank lending; 2. Extending the control to bank involvement with commercial paper issues; 3. Extending the supervisory to non-bank finance company; increased the required reserve ratio; 4. Tightening of licensing of new bank branches; 5. Imposing the fines on banks which expand more rapidly than permitted; 6. Increasing the required reserve ratio and tightening prudential regulation

Source: McLeod (1999, p. 293-295) and Chua, BH (2003)

After a series of deregulation policies during 1980s, the authorities decided to reduce the speed of the banking expansion. During 1995 and 1996, the Central Bank introduced some policies related to the prudential aspect of banks. McLeod (1999, p. 281-285) explained that during those periods the Central Bank re-regulated the industry by re-imposing controls of

bank lending (in 1995); extending the control to bank involvement with commercial paper issues (in August 1995); extending supervision to non-bank finance companies (December 1995); increasing the required reserve ratio (February 1996); tightening of licensing of new bank branches (June 1996); increasing the required reserve ratio and tightening prudential regulation (in April 1997). Further, the 1997 economic crisis had heightened the importance of re-structuring the industry as well as increasing prudential concern.

The consolidation was started on December 1997. The 1997 economic crisis generated distress in the banking industry. In order to improve the performance of the state owned banks, the Central Bank decided to merge four State Owned Banks. The authorities also closed the operation of twenty three banks in 1997. The liquidation policies contributed to the reduction on the number of banks. The consolidation process was continued by the introduction of the Indonesia Banking Architecture (API) on January 2004. The policy essentially encourages banks to reach their economies of scale as well as fosters the creation of a healthy banking system.

| Table 2. The Microeconomic Policies in Indonesia Banking 1997 - 2010	
Y e a r	**Policy Details**
Consolidation	
1997	1. Banks liquidation (23 banks). 2. Banks recapitalization 3. Merger of 4 State Owned Banks became Bank Mandiri
2003	Privatization of the bailout banks under the Indonesia Banking Restructuring Agency (IBRA)
2004	The introduction of the Indonesia Banking Architecture (API)
2004 - 2010	A series of mergers and consolidation conducted in banking to comply with Single Presence Policy and Minimum Capital Requirement.

Source: Chua, BH (2003) and Central Bank of Indonesia (2010)

The banking architecture provides direction of the Indonesia banking system development in the next ten years. The policy aims to create a strong, healthy and efficient banking structure. In order to achieve its objectives, the Central Bank developed six pillars which are creating a healthy domestic banking industry; inventing an effective system for regulating the banking sector based on international standards; increasing the monitoring function of central banks based on international standards; creating a strong banking industry with highly competitive

banks and fostering good corporate governance; realizing the proper infrastructure to support the creation of a healthy banking system; and lastly increasing consumers' empowerment and protection (Bank of Indonesia, 2010).

We suspect that at least two policies under the Indonesian Banking Architecture will directly affect the market structure and competition in the banking industry. First is the minimum capital requirement as regulated under the Central Bank Regulation number 10/15/PBI/2005. The second policy is the single presence policy as explained in the Central Bank Regulation number 8/16/PBI/2006.

Under Indonesian Banking Architecture, banks must increase their capital which is aligned with their business scale (Bank of Indonesia, 2010). Bigger capital will enable banks to maintain their business and risk develop the infrastructure such as information technology and increase the scale of support of the expansion of credit capacity. Capital consists of in-paid capital and disclosed reserves. According to the regulation, all existing banks, including the banks established by regional governments, should attain minimum capital of Rp100 billion by 31 of December 2010 otherwise the Central Bank will impose several restrictions to the banks. In order to increase capital, banks are allowed to receive additional capital injections from existing owners,
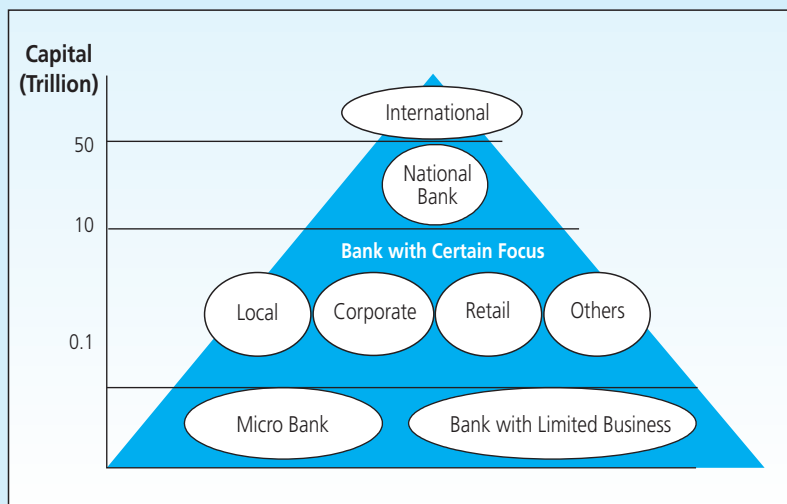
Source: The Central Bank of Indonesia, (2010), Indonesian Banking Architecture, www.bi.go.id

Figure 1.
The Vision of Indonesian Banking Architecture Policy in 2014

merge with other banks, be acquired by bigger banks, or sell their shares on the capital market (Bank of Indonesia, 2010). In the next ten or fifteen years, the Central Bank plans to reduce the number of banks to 60, which consisting of 2-3 international banks, 3-5 national banks, and 30-50 specialized banks (Bank of Indonesia, 2010).

The single presence policy was introduced to re-arrange the structure of bank ownership (the regulation of Bank of Indonesia, Number 8/16/PBI/2006). Single ownership refers to the condition where one party is just eligible to be a main shareholder in one bank. The regulation applies to shareholders who owned more than 25 per cent and those with ownership less than 25 percent but can control the banks. According to the rule, there should be an adjustment of ownership structure by transferring the ownership (some or all) to one bank. Therefore they only become a main shareholder in one bank. In addition, banks under the same ownership are encouraged to merge. At last, they can set up a Bank Holding Company.

The study aims to assess the impact of consolidation policies in the banking industry on market condition. The consolidation policy was started from the 1997 economic crisis and was further enhanced by the introduction of the Indonesia Banking Architecture on January 2004. Referring to Table 3, a large number of mergers and acquisitions took place in the Indonesia banking industry between 1997 and 2010. One merger occurred in large bank market conducted by the Bank Niaga and Bank Lippo in order to comply with the single presence policy. In addition, there were 7 mergers in medium-sized banks and 7 mergers conducted by small banks.

A series of mergers and acquisitions reduces the number of banks. This raises some important issues such as, whether a smaller number of banks reduced or increased the degree of concentration in the banking industry; whether a smaller number of banks created a more concentrated market or improved the market share distribution. Further we are also interested in understanding the competition in the banking industry during the implementation of consolidation policy, and whether consolidation generates a significant change in the competition. Lastly, this paper would like to examine the link between the degree of market concentration and the nature of competition during the consolidation process in the Indonesia banking industry.

Bank Category	No	Merging Bank	Year	Nama of New Bank
Table 3. **The list of mergers and acquisition between 2000 and 2010**				
Large Banks	1	PT Bank Niaga PT Bank Lihalo	2008	PT Bank CIMB Niaga Tbk
Medium-Sized Banks	1	Bank Dai-Ichi Kanggo Bank IBJ Indonesia	2000	PT Bank Mizuho Indonesia
	2	Bank Bali Bank Artha Media Bank Universal Bank Prima Express Bank Patriot	2001	PT Bank Permata Tbk
	3	PT Bank Sumitomo Mitsuo Indonesia Sakura Swadarma Bank	2001	PT Bank Sumitomo Mitsuo Indonesia
	4	UFJ Indonesia Bank Tokai Lippo Bank	2001	UFJ Indonesia Bank
	5	UFJ Indonesia PT Bank of Tokyo Mitsubishi	2006	PT Bank of Tokyo Mitsubishi UFJ Ltd.
	6	Bank Hagakita Bank Haga Bank Rabobank Duta	2008	PT Bank Rabobank International Indonesia Bank
	7	Bank Buana Bank UOB Indonesia	2010	PT Bank UOB Buana Tbk
Small Banks	1	Bank Pikko Bank CIC Bank Danpac	2001 2001 2004	PT Bank Mutiara Tbk
	2	Bank Artha Graha Bank Inter-pacific Tbk.	2005	PT Bank Artha Graha International Tbk
	3	Commonwealth Indonesia Artha Niaga Kencana	2007	PT Bank Commonwealth
	4	Bank Multicor Bank Windu Kentjana	2007	PT Bank Windu Kentjana International Tbk.
	5	Bank Harmoni International Bank Index Selindo	2008	PT Bank Index Selindo
	6	Bank Haga Bank Hagakita	2008	Rabobank Duta Bank
	7	Bank OCBC Bank NISP	2009	PT Bank OCBC-NISP Tbk

Source: Banks' Annual Financial Report Published by the Central Bank of Indonesia

II. THEORY

Many studies were interested to assess the impact of consolidation on concentration and competition. Further, some journal articles also discuss the relationship between the degree of concentration and competition. There are two prominent approaches dealing with this issue, which is structural and non-structural (Bikker and Haaf, 2002).

According to the first approach, there is a direct relationship between market structure, firms behavior and industry performance. This approach is based on traditional structure-conduct-performance hypotheses (SCP). The second approach is known as the non-structural approach. It has a different view on the relationship between those three elements. As explained by Shaffer (1994a), competitive outcomes such as efficient prices can be established in un-concentrated as well as highly concentrated markets therefore the link between market structure and performance is not linear. As the relationship among market structure and performance is not linear, they suggested focusing on the competitive conduct of banks instead of relying on the market structure (Bikker and Haaf, 2002).

2.1. Structural Approach

The first foundation of traditional structure-conduct-performance approach was built by Manson (1939). He concluded that fewer firms in the market will generally lead to less competitive conduct, in terms of higher prices and reduced output levels, simply likes a monopolist model. Furthermore, a concentrated market will produce less competitive performance, where the price ratio to cost will be higher at the expense of lower consumer welfare. The small number of firms might also facilitate firms to collude with their competitors. The collusion aims to boost price, so it will be much higher than marginal cost (Yeyati and Micco, 2003b).

On the other hand, the competitive market will produce an efficient outcome as price equals marginal cost. Thus, an increase in firm numbers will lead to more competitive conduct by lowering price and reducing firms' profitability. In addition, the structure-conduct performance (SCP) approach believed that the competitive market, which is produced by a low concentration in the market, will deliver higher consumer welfare (Shaffer, 1994a). Efficient firms are able to produce a higher output with lower prices.

Bain (1951) tested the structure-performance hypotheses empirically on American manufacturing industry during period 1936 to 1940. His research confirmed the structure-performance hypotheses. By using a Z score test, he compared the profit rates of a group of firms that worked in a high concentrated market and those that worked in less concentrated

market. He found that the profits rates of firms in industries of high seller concentration should on average be larger than those firms in industries of lower concentration.

Calem and Carlino (1991) found a correlation between market concentration and performance in banking. Bain employed profit to assess market performance, Calem and Carlino tried to use price to reflect market performance. Their conclusion supported traditional structure-performance hypotheses that the concentrated market might contribute to collusive behavior (Calem and Carlino, 1991). Further, the research claimed that the concentrated market is inefficient because prices are higher than marginal cost. It is also not equitable because concentrated market produces higher profits at the expense of consumers (Berger and Hannan, 1989).

The structural approach has become the foundation of antitrust policy in many countries. The US Department of Justice has long adhered to this view by maintaining an explicit policy of challenging mergers between rival firms that result in concentration levels above certain threshold (Shaffer, 1994b). The Indonesia Legislation number 5, 1999 employs the structural approach to determine the unlawful conduct of firms based on its impact to competition. The Law applies to all industries. Further, according to the Government Regulation number 28/ 1999 on article 8 (2), we can find that the merged banks could not have the asset (after merger) of more than 20 percent of total assets in the banking industry. Thus, 20 percent is perceived as the threshold where the merger would bring a negative effect into competition.

2.2. Non Structural Approach

The first argument against the traditional structure performance hypotheses came from Demzets (1973) and Pelzman (1977). According to them, the source of concentration is efficiency instead of market power. Their finding is labeled as Efficiency-Structure hypotheses. They explained that the difference in firm-specific efficiencies within markets can create unequal market shares and high level of concentration. The difference in efficiency might be derived from superior management and production technology (Neuberger, 1997).

Manson implicitly assumes that the concentrated market facilitates firms to boost price. Therefore market, where the price is higher than the marginal cost, perceives as less efficient. Shaffer (1994b) argued that lower price is not a good indication to measure the market efficiency. He defended his idea with the explanation that any extra efficiency among leading firms in a competitive market would tend to show up as lower, not higher, prices.

SCP assumes that there is a single-way relationship between structure, conduct and performance. Hence, market structure affects the firms' behavior further the behavior influences

the market performance. The causal relationship becomes unclear because firms' decision to enter the market might be affected by the expectations of the degree of competition in the market stage (Vesalla, 1995, p. 18). The non-structural approach argued that both the market structure and firms' conduct are endogenous, since there is a feedback effects from conduct back to market structure (Vesalla, 1995, p.18). In addition, market performance may also influence the firms' decision to enter the market.

The non-structural approach claimed that the firms' profit is a poor measure of market power. Vesalla (1995) argued that market power and profits are not necessarily positively correlated (p. 19). The monopolists tend to be less efficient and it will affect the firms' profitability. Hence inefficient behavior will reduce the profit rather than increase the firms' profit.

After that some researchers tried to use the Lerner Index to measure the market performance. Shaffer evaluated the usage of the Learner Index as a measurement of market performance. Shaffer (1994b) proved that the Learner index is a poor proxy of social welfare because the linkage between the index and total welfare is not monotonic. The decreasing number of firms reduces consumers surplus, but it increases producer surplus. Thus, mergers may increase total surplus if the cost efficiency derived from mergers is higher than the reduction of consumer surplus. Further, Shaffer (1994b) suggested measuring the cost structure as an impact of consolidation policy, whether the cost structure becomes more efficient or not.

The non-structural approach argues that the link between concentration and competition is not linear because it depends on various factors. The contestable market developed by Baumol et al (1982) was referred by some researchers to explain competitive pricing in a concentrated market. The main characteristic of contestable markets is free entry and exit. In such markets an entering firm can attract customers by charging a low price and can recover any cost of entry while abandoning the market if older firms retaliate by under-pricing in turn. As entry and exit are free, the market might produce competitive pricing because less efficient firms can be excluded from the market and replaced by the more efficient entrant.

Next, the non-structural approach focused on the information derived from competitive behavior of firms. They believed that in learning about the market, we need to concentrate on firms conduct instead of market concentration. In assessing competition, Panzar and Rose (1987) developed a method based on the firm cost structure[3]. The method tries to distinguish the competition level in markets by finding the relation of firms' revenue to factor price changes.

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3 Panzer, J.C., Rose, J.N., (1987) developed a measurement to assess the competition in the market by observing the banks behaviour. The H-statistic reflects the elasticity of changes on input price to banks revenue.

They derived a generally applicable testable implication of monopoly profit maximizing behavior. Their model is focusing on the sum of factor elasticity of the reduced form of the revenue equation. The factor elasticity capture the effect of a proportional shift in average, total, and marginal cost curve even when cost data themselves are unavailable.

They concluded that in monopoly markets, the value of elasticity is negative because an increase in input prices will increase marginal costs, reduce equilibrium output and subsequently reduce revenues; hence elasticity will be zero or negative (Bikker and Haaf, 2002). In perfect competition, the value of elasticity is unity, because the average cost will shift proportionally with the changes in factor price.

Many studies employed the Panzar-Rose (PR) method to measure the impact of consolidation policies on competition in the banking industry. In the early 1980s, the deregulation of deposit interest rates in some developed countries had heightened competition and led to a wave of mergers and acquisitions. Shaffer (1982), Molyneux et al (1994), Bikker and Haaf (2002) and Bandt and Davis (2000) examined the impact of the banking consolidations in the United States and European countries on competition.

The consolidation in the US banking market was mostly driven by markets as 'merger was perceived as one way to improve their diversification, efficiency or possibly market power' (Shaffer, 1994, p. 3). By using samples from banks in some states in the United States between 1979 and 1980, Shaffer (1982) proved that the banking market was competitive. The study found that in most of the market, the significance test of the elasticity rejected the existence of market power.

In addition to that, the European banks also faced structural changes after the implementation of the European Single Market, included the financial services market. Under the policy, there was limitless access to enter markets of the other member countries (Molyneux et al, 1994). Molyneux et al (1994) tried to assess the impact of consolidation on competition in the early stage of implementation of the Single Market policy. They focused on assessing the banks behavior between the period 1986 and 1989. They had quite similar findings to Shaffer (1982). The competitive environment in the banking industry was well sustained. Monopolistic competition was established in countries such as Germany, United Kingdom, France and Spain. However, the banking market in Italy was performed under monopoly or conjectural variation short run oligopoly.

More recent data was employed by Bandt and Davis (2000). Quite similar findings appeared with Molynuex et al (1994). Bandt and Davis (2000) aimed to measure the level of competition across different groups of banks, which are large, medium and small during the period of 1992

to 1996. According to them, the large banks in German and France were working under monopolistic competition, while the smaller banks were acting as a monopoly. Regarding Italy, both small and large categories were working under monopoly market.

Extending the coverage of countries, Bikker and Haaf (2002) tried to investigate the competitive behavior in 23 developed countries all over the world during 1989 to 1998. The banking market in 23 countries was indicated to be working under monopolistic competition. The findings supported De Band and Davis (2000) where competition among larger banks was stronger than other groups.

Quite a fewer studies have been conducted in emerging countries. Gelos and Roldos (2002), Claessens and Laeven (2004) and Yeyati and Micco (2007) assessed the competitive behavior of banks in some emerging countries. It is important to conduct the study for emerging markets as we might find quite different conditions compared to mature markets. The Latin American countries also experienced consolidation with a substantial number of mergers and acquisitions. The consolidation was firstly initiated by government through the Central Bank. Further, it was also driven by market forces. Gelos and Roldos (2002) explained that the three largest private banks in Brazil initiated the consolidation to sustain their competitiveness. In addition, the five largest private banks in Argentina gained substantial market share from the combination of organic growth and acquisitions.

Consolidation did increase concentration in emerging market of Latin American countries. However, the concentrated market did not lead to a less competitive situation. This conclusion was generated from three different studies of Gelos and Roldon (2002), Claessens and Laeven (2004) and Yeyati and Micco (2007). The Contestable market principle might be helpful to explain this situation. The removal of the restriction of entry to the market effectively preserved the competitive environment (Classens and Laeven 2004).

On the other side, the consolidation which was mostly driven by government, as happened in most Asian countries, showed different outcomes. Instead of increasing the concentration, the wave of mergers and acquisitions in Asian countries reduced concentration (Gelos and Roldos, 2002). In relation to competition, the less concentrated market in the Asian banking market was perceived as competitive.

This illustration of findings under the non-structural approach clearly supports the notion that the relationship among market concentration, firms conduct and market performance may not linear. The consolidation itself, which was taken from broad varieties of policies, might create concentrated or less concentrated markets. Further, competition in concentrated market might be sustained by lessening the entry barrier into the market (Classens and Laeven 2004).

2.3. Panzar and Rose Approach

As illustrated in the above section, we could not rely on market structure information to determine the competition level in the banking market. It might be misleading to depend on the information about market structure as some studies proved a non-linear relation between market structure and competition. Moreover, Bikker and Haaf (2002) proved that concentration indices such as the Concentration Ratio (CR) and the Herfindahl-Hirschman Index (HHI) appear to be inversely correlated with the number of firm. The countries with smaller number of banks tend to have a higher concentration level.

In order to measure competition in the market, this study will employ a method used by Panzar and Rosse (1987). The method is based on properties of reduced form revenue equations at the firm level, and the data of revenues and factor prices (Panzar and Rose, 1987). Therefore the method will directly assess the competitive behavior of banks to define the market structure.

The Panzar-Rose method will calculate the sum of elasticity of the reduced form revenues with respect to factor prices. This sum of elasticity is given the symbol H (Vesalla, 1995). The value of elasticity will provide information about banks conduct, and furthermore it will determine the structure of the market. The assumption underlying this method is that market power of banks is measured by the extent to which changes in factor prices (unit costs) are reflected in revenue earned (Vesalla, 1995). If the industry is competitive the elasticity will be high, otherwise the elasticity will be low or even negative in the case of monopoly and collusive oligopoly.

The properties of H allow us to distinguish empirically between common imperfect competition theories of price formation as characterizations of the competitive behavior of Indonesia's banks, whether monopoly or perfect collusion, monopolistic competition or perfect competition (Vesalla, 1995).

The Panzar-Rose empirical model assumes that banks have a log-linear marginal cost and revenue function (Bikker and Haaf, 2002).

$$Ln(MC) = \alpha_{0+}\alpha_1 ln\,(OUT) + \sum_{i=1}^{m} \beta_i \ln(\text{FIP}_i) + \sum_{j=1}^{p} \gamma_i \ln(\text{EX}_{\text{cost,i}}) \qquad (1)$$

$$Ln(MR) = \delta_{0+}\delta_1 ln\,(OUT) + \sum_{k=1}^{q} \varphi_i \ln(\text{EX}_{\text{revenue,i}}) \qquad (2)$$

Where OUT is output, n is the number of banks, FIP denotes factor input prices, and $\mathrm{EXi_{revenue}}$ and $\mathrm{EXi_{cost}}$ are other variables affect banks' revenue and cost functions, respectively. The empirical application of Panzar and Rose approach assumes a log-linear marginal cost function, where dropping subscripts referring to bank' i (Bikker and Haaf, 2002).

Further, the Rose Panzar model assumes a profit maximizing for individual banks. The profit maximizing banks will produce at the level where marginal cost is equal to the marginal revenue, yielding the equilibrium value for output:

$$
\begin{aligned}
&Ln(OUT)\\
&= \left(\alpha_0 - \delta_0 + \sum_{i=1}^{m} \beta_i \ln(\mathrm{FIP_i}) + \sum_{j=1}^{p} \gamma_i \ln\left(\mathrm{EX_{i,cost}}\right) - \sum_{k=1}^{q} \varphi_i \ln\left(\mathrm{EX_{i,revenue}}\right) \right) \Big/ (\delta_1 - \alpha_1)
\end{aligned}
\tag{3}
$$

In the empirical analysis, the following operationalization of the reduced-form revenue equation is used (Bikker and Haaf, 2002, p.2196):

$$
\begin{aligned}
\ln(TIR_{it}) = \alpha_i &+ \beta \ln(AFR_{it}) + \gamma \ln(PPE_{it}) + \delta \ln(PCE_{it}) + \sigma \ln(OI_{it})\\
&+ \sum_j \beta \ln(BSF_{jit}) + \varepsilon_{it}
\end{aligned}
\tag{4}
$$

Where, TIR is the ratio of interest income to the total balance sheet; AFR is the price of funding (funding rate); PPE is the price of personnel expenses (wage rate); PCE is price of capital expenditure (capital price); OI is ratio of other income to the total balance sheet; and BSF is bank-specific exogenous factors, such as the risk component, differences in the deposit mix and size (banks' real assets) (Yeyati and Micco, 2007, p.1637).

Under this condition, H shows the sum of the elasticity of the reduced-form revenue function with respect to factor prices.

$$
H = \sum_j \frac{\partial R_i}{\partial FIP_{j,i}} \frac{\partial FIP_{j,i}}{\partial R_i}
\tag{5}
$$

The level of competition determines the value of H, whether monopoly or perfect collusion, monopolistic competition or perfect competition. Below is a formula to calculate H, where H is the sum of elasticity, which consists of the elasticity of revenue with regard to funding cost changes (β), elasticity of revenue with regard to changes on human resource expenditure (γ) and elasticity of revenue with regard to capital price changes (δ).

$$H = \beta + \gamma + \delta \tag{6}$$

Panzar and Rose proved that under monopoly, an increase in input prices will increase marginal costs, reduce equilibrium output and subsequently reduce revenues; hence H will be zero or negative (Bikker and Haaf, 2002). In other words, markets where monopoly power exists will yield a negative relation between those two variables as gross revenue responds in the opposite direction to a change in a unit cost (Vesala, 1995). The same outcome is also found in monopolistic competition without the threat of entry, i.e. with the fixed number of banks. The market consists of some banks; however there are barrier to enter the market, therefore the number of bank is unchanged. Vesalla (1995) proved that in such market H is zero or negative, where similar with Panzar-Rose findings on monopoly market.

In analyzing monopolistic competition, the Panzar-Rose approach is based on the comparative statics properties of the monopolistic competition Chamberlinian equilibrium model (Bikker and Haaf, 2002). In the limit case of the monopolistic competition model, where banks' products are regarded as perfect substitutes of one another; the Chamberlinian model produces the perfectly competitive solution, as demand elasticity approaches infinity (Bikker & Haff: 2002: pp. 2195). In a perfectly competitive market, increasing input prices will increase average cost
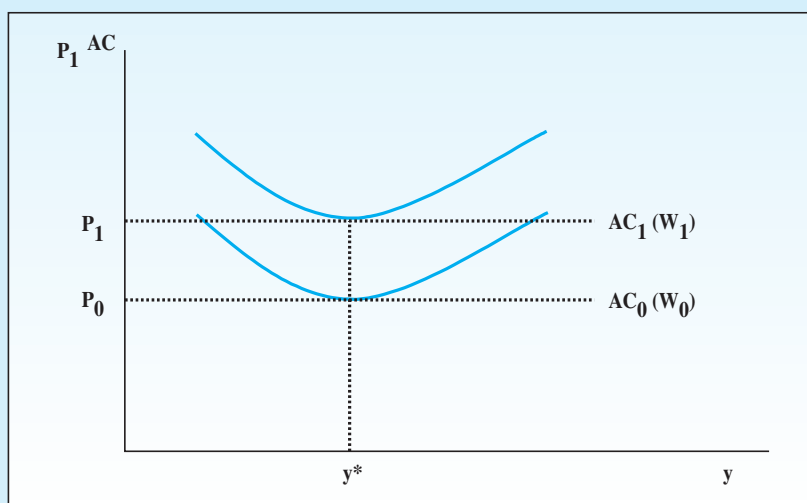

Figure 2.
H in perfect competition

proportionally. Exit of some banks increases the demand faced by each of the remaining banks, leading to increases in prices and revenues equivalent to the rise in costs (Bikker and Haaf, 2002). Finally, the value of H in perfectly competitive markets is equal to one.

In the case where monopolistic competition model recognizes product differentiation the value of H is positive but less than one. As shown in figure 3, monopolistic competition is an intermediate case between monopoly and perfect competition. Monopolistic competition produces 'excess capacity' where y_i^* is produced at average cost (point A) higher than minimum average cost (point B). In addition, price p_i^* exceeds marginal cost (MC), compared to competitive solution p^c (Vesalla, 1995).

Figure 3.
Monopolistic Free Entry (Chamberlinian) equilibrium
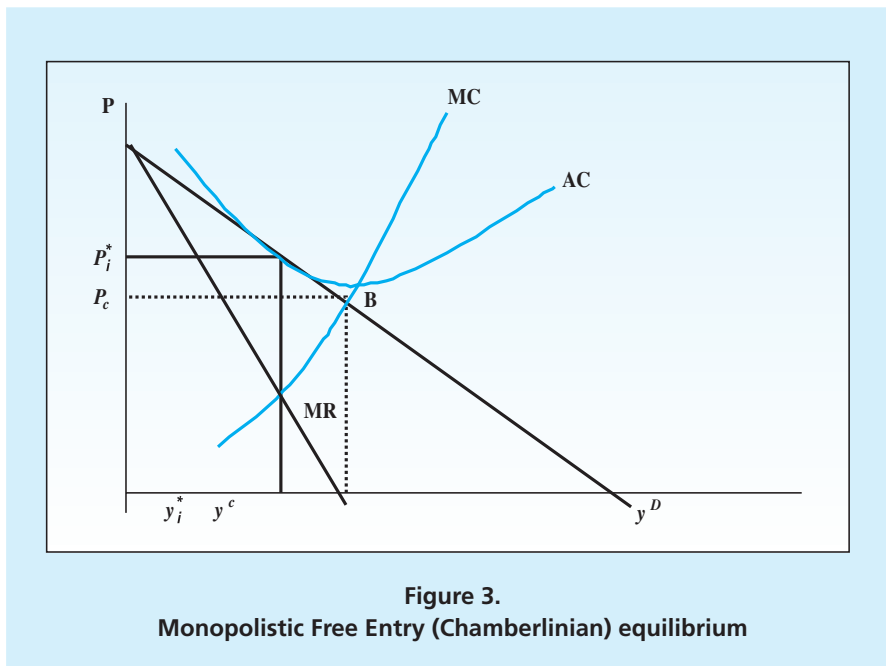
Banks in Chamberlinian equilibrium are not free from market power but they cannot receive supernormal profits, since banks price at average cost (Vesalla, 1995). Therefore, the value of H in this condition is positive but less than one. It means that the changes to input prices positively affect revenue but are less than one.

This model is more consistent with the observation that banks tend to differentiate themselves by various product quality and advertising, although the core services provided by them are fairly homogenous (Vesalla, 1995, p. 50). The product differentiation is important in

order to create less elastic demand (Tirole, 1988). As product is less differentiated, less market power is exercised and the value of H will be higher. High switching cost is also the source of market power. The account holders of the banks bear high switching cost to move from one bank to others. If customers plan to switch the supplier then they must create a new account number. It implies a lot of paperwork. In addition, the customer must inform about the changes to their business relation (Canoy et.al, 2001).

At last, in an oligopoly market, the value of H may also be positive, where there are strategic interactions among fixed number of banks (Bikker and Haaf, 2002). However, in the case of perfect collusion in an oligopoly, the Rose and Panzar method produces a negative value for H, similar to the monopoly model.

Table 4. Summary of the Discriminatory Power of H	
Value of H	Competitive environment
H ≤ 0	Monopoly equilibrium: each bank operates independently as under monopoly profit maximization conditions (H is decreasing function of the perceived demand elasticity) or perfect cartel.
0 < H < 1	Monopolistic competition with free entry equilibrium (H is an increasing function of the perceived demand elasticity).
H = 1	Perfect competition. Free entry equilibrium with full efficient capacity utilization.

Source: Bikker and Haaf (2002, p. 2195)

There are five assumptions need to apply the Panzar-Rose method. *First*, banks are treated as single product firms that act as financial intermediaries. Therefore banks produce interest revenues by employing intermediate funds, labor and capital as inputs (De Bandt and Davis, 2000). *Second*, we have to assume that higher input prices are not associated with higher quality services that generate higher revenues. Gelos and Roldos (2001) explained that if the correlation exists, there might be bias in interpreting H. The *third* assumption is that the market is in equilibrium in the long run. The fourth and fifth assumptions are considering banks as profit maximization institutions and they have normally shaped revenue and cost functions (Gelos and Roldos, 2002, p. 13-14).

III. METHODOLOGY

3.1. Empirical Model

In assessing the competition in the Indonesia banking market between 2001 and 2009, we will run a regression model to estimate the following reduced form revenue equation. In following equation, the four explanatory variables outside the bracket represent bank specific factors.

$$
\ln(TIR_{it}) = \alpha_i + \beta \ln(AFR_{it}) + \gamma \ln(PPE_{it}) + \delta \ln(PCE_{it}) + \sigma \ln(OI_{it})
$$
$$
+ \partial \ln(EQ_{it}) + \vartheta \ln(LO_{it}) + \chi \ln(BDEP_{it}) + \tau \ln(DDC_{it}) + \varepsilon_{it}
$$

(7)

Table five provides detail information about the variable specification. It explains the definition and proxy used to measure each variable.

Table 5. Variable Spesification	
Variable	**Variable Spesification**
TIR (revenue)	Ratio of annual interest income to total assets
AFR (funding rate)	Ratio of annual interest expenses to total deposit
PPE (wage rate)	Ratio of annual wage and salary expenses to total assets
PCE (capital rate)	Ratio of other expenses to fixed assets
OI (other income)	Ratio of others income (operational and non-operational incomes) to total assets
EQ (capital risk)	Equity divided by total assets
LO (loan risk)	Loans divided by total assets
BDEP (deposit mix)	Ratio of interbank deposits to total deposit
DDC (deposit mix)	Ratio of demand deposits from customers to total deposit and short term funding

The study will employ a pooled regression, more specifically the Fixed Effect Model. There are some reasons underlying the application of the pooled regression model. *First*, since the application of a cross-section regression implicitly assumes that all banks have access to the same factor markets therefore they only differ in terms of the scale of operation (De Bandt and Davis, 2000, p. 1050) the cross-sectional regression is unable to capture the time-series dimension inside the model. Vesalla (1995) concluded that it is difficult to infer whether the changes on competition over time are statistically significant if we rely on the estimation of H using the

cross-section regression for each year. Some studies such as Vesalla (1995) and Yeyati and Micco (2003) suggested consolidating the individual cross sections into a single pool data set. Polled estimation will produce more reliable estimates of H as it examines the behavior of banks over time.

The *second* consideration is that the study will also explore the relation between concentration and competition across time. Therefore we emphasize the dynamic dimension, which cannot be incorporated in the cross-section method (Yeyati and Micco, 2003a).

The *third* benefit of the implementation of pooled regression method relies on the ability to capture the non-time-varying determinants of banks' revenues. The application of the Fixed Effect Model allows the inclusion of bank fixed effects that can be used to control the heterogeneity between banks that are not captured in the model. The Fixed Effect Model will treat the heterogeneity of the non-time-varying determinants of revenues by entering the cross-section dummies (for each bank). Therefore the model will introduce the different intercepts capturing the banks-specific variables that are not explicitly addressed in the regression specification (De Bandt and Davis, 2000).

In order to capture the impact of the consolidation policy on the banks' behavior, this study tested the changes on the input prices coefficients. Referring to Gelos and Roldos (2002) the test can be implemented by dividing the observation period into two sub-periods and interacting the input price variables (ln(AFR), ln(PPE) and ln(PCE)) with a dummy variable that takes the value of one in the second sub-period' (p. 15). The interaction variables will show whether the consolidation policies significantly changed the banks' behavior; if the interaction variables generate significant values, they indicate a structural break in the statistical relationship between revenues and input prices (Gelos and Roldos, 2002, p. 15). In addition, the value of interaction variables will determine the direction of changes on competition. If they are positive, we can conclude that the consolidations increase competition or otherwise. Further if the H-statistics is positive between 0 and 1 and the cumulative value of the interaction variables is positive, it implies a stronger competition (Vesala, 1995, p. 56)[4].

The first period is from 2001 to 2003 and the second period starts from 2004. This study chooses 2004 as a year marking of structural break because starting from 2004; the Central Bank of Indonesia formally enforced the consolidation process by introducing the Indonesia Banking Architecture policy.

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4 It refers to Bikker and Haaf (2002, p. 2203). They explained that the result of Vesala (1995) implies that the interpretation of H-statistics between 0 and 1 is a continuous measure of the level of competition. Further Bikker and Haaf (2002) described the higher value of H can be used as an indication of the stronger level of competition (p. 2203).

One of the assumptions under the Panzar and Rose method is that the market is in equilibrium (Claessens and Laeven, 2003). We need to check that the assumption is fulfilled by running the test on market equilibrium. Referring to some studies, the market equilibrium test must be able to validate that the Panzar-Rose statistics can deliver reliable results (De Bandt and Davis, 2000).

In order to have an equilibrium test, some studies suggest testing whether the input prices are related to the industry return. Here, we will modify the reduced form revenue equation by replacing the dependent variable with the ratio of net income to total assets as an endogenous variable (De Bandt and Davis, 2000).

$$Ln(ROA_{it}) = \alpha_i + \beta Ln(AFR_{it}) + \gamma Ln(PPE_{it}) + \delta Ln(PCE_{it}) + \sigma Ln(OI_{it}) + \partial Ln(EQ_{it}) + \vartheta Ln(LO_{it})$$
$$+ \chi Ln(BDEP_{it}) + \tau Ln(DDC_{it}) + e_{it} \qquad (8)$$

The equilibrium is defined as a condition where the value of equilibrium E-statistics is zero. The E-statistic is defined as the summation of β, γ, *dan* δ. Further, we can employ a F-test to verify the statistical significance of the test whether the $E = 0$ (Claessens and Laeven, 2003).

3.2. Data

Data were obtained from the Central Bank of Indonesia. It consists of the unconsolidated annual balance sheets and income statements of the commercial banks. The sample contains 128 banks for each year approximately; however the exact number in the sample for each year varies. The yearly variation on the number of banks is caused by mergers, acquisitions, bank liquidations and banks entry during the observation period. In the case of mergers and acquisitions, the database only keeps the data of the new institution which is usually the bigger bank.

Table 6 provides detail information about the number of bank for each category. According to the database, the Central Bank divides commercial banks into six categories. Currently Indonesia has 4 State Owned Banks, 68 local private banks which are comprised of banks which engaged with foreign exchange services and those which are not. Even though the Central Bank has grouped the 68 banks into local banks, actually some of them were bought by overseas investors during the privatization policy in the late 1990s. There are 20 joint ventures banks, where the owners are foreign and local investors. There are 11 foreign banks which are usually branch offices of foreign banks. Finally, we have 25 regional banks that usually operate

Table 6. Sample Size	
Type of Banks (based on the Central Bank Categorization)	Number of Banks
State Owned Banks	4
Private Banks - Foreign Exchange	39
Private Banks - Not engage in foreign exchange	29
Joint Venture Banks	20
Foreign Banks	11
Regional Banks	25
Total	128

Source: The Indonesian Banking Statistics, 2009, the Central Bank of Indonesia

in their province. The shareholders of the regional banks are the government of the province and the municipalities.

Compared to other developing countries in South East Asia, the number of banks in Indonesia is large. However, the market is concentrated as a few large banks dominate it. The banks' balance sheet shows that on average 3 from 113 banks control more than forty percent of the industry between 2001 and 2009. Descriptive statistics information about the distribution of'the assets and capital support the notion of the highly concentrated market. Table 7 illustrates the distribution of the assets and equity from all banks in 2009. In terms of assets, a quarter of market is dominated by single bank which is Bank Mandiri with assets 370 trillion rupiah and

Table 7. The Descriptive Statistics of Asset and Equity All Banks in 2009 (in Million Rupiah)		
Statistics	Asset	Equity
Mean	22,158,195	2.267.144
Median	3,978,396	547.938
Q4 (100% data)	370,310,994	35.108.769
Q3 (75% data)	13,356,445	1.370.931
Q2 (50% data)	3,923,234	539.862
Q1 (25% data)	1,523,057	164.954
Skewness	4,44	4,16
Kurtosis	23,26	21,00
Jarque-Bera	2,242,80	1.803,03
Probability of JB	0,00	0,00

equity more than 35 trillion rupiah. The asset of Bank Mandiri is 15 times larger than the average and the equity is 17 times larger than the average.

Since the market is positively skewed, the median is a preferred measure of central tendency. Table 7 shows that all statistics to assess the normality distribution of data are violated. The values of skewness are positive both for assets and equity, implying the positively skewed distribution. The JB values are positive and significantly different from one, indicating that the data rejects the normality assumption. Referring to the data, half of the bank (56 banks) had equity less than 550 billion rupiah. In addition, more than 66 percent (85 banks) had equity less than 1,371 billion rupiah. On the other hand, a very small portion of banks - less than 1 percent or only 7 banks - has equity more than 10 billion.

The above figures will be used to calculate break point to divide the sample based on the size. The sample division into large, medium and small banks is important to capture the real behavior of banks in competing with other banks in their categories. Large banks are assumed to work at the national or even international level, while small banks focus on local or specific industries and often do not have customers outside their defined market.

Table 8. Three Categories of Banks based on the Value of Equity		
Category	Equity (IDR)	Sample Size [4]
Large Banks	> 10 trillion	7
Medium-sized Banks	1 - 10 trillion	36
Small Banks	< 1 trillion	70
Total		**113**

The value of equity in 2009 will be employed as a basis to break the sample into large, medium, and small banks. Large banks are those with equity more than 10 trillion rupiah. The medium-sized banks are working with the capital from 1 to 10 trillion rupiah. Finally, the small banks are those with equity less than 1 trillion rupiah. In terms of the number of banks, the small bank category dominates the market; however the market is controlled by the larger group.

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5 The categorization is based on the data of Indonesia banking in 2009.

IV. RESULT AND ANALYSIS

4.1. Competition in Banking Industry

The finding is robust using the two different measurements of revenue with respect to the level of competition in the Indonesia banking industry. Some studies employed the ratio of interest income to total asset to measure the banks' revenue. Bikker and Haaf (2002) explained that this proxy is more consistent with the assumption underlying the Panzar and Rose method, where banks are assumed to be a single product firms that acts as financial intermediaries. Therefore the main business of banks is financial intermediation.

On the other hand, De Bandt and Davis (2000) argued that as a response of tighter competition, banks increase their interest to non-interest income activities – including asset management income, mutual funds and insurance (p. 1047). They proposed to employ both measurements on the ratio of interest income to asset and the ratio of total revenue to asset as a validation method to test if the model is robust.

Overall both specifications produce similar outcomes. However the interest income specification provides some larger coefficients. We choose to employ the first proxy because the Indonesian banking industry still relies heavily on interest-based-income. The data of the annual financial report of all banks between 2001 and 2009 shows 88 percent of banks' income was originated from interest income. Therefore the first proxy will capture the real portrait of competition in the Indonesian banking industry. In addition, the study includes other income which means income originated from non-interest activities as one of the explanatory variables in order to capture the growing trend of non-interest based income in banks revenue.

One critical assumption under the Panzar-Rose method is whether the observations are in long-run equilibrium. As described in the previous part, we have conducted an equilibrium test by running a regression of the revenue reduced-form by replacing the dependent variable by return on equity. We employ the method introduced by Claessens and Laeven (2003) in deriving the Return on Asset (ROA). As ROA can take on a small (negative) value, they suggested computing the dependent variable ROA' by using the formula of Ln (1+ROA) (p. 11). The estimation showed that the joint coefficient of β, γ and δ is not significantly different from zero (please refer to the appendix for the complete estimation result). Therefore, the Panzar-Rose method is suitable to assess competition in the Indonesia banking market between 2001 and 2009.

The Panzar-Rose model has been applied to around 128 banks between 2001 and 2009. The redundant test was employed to examine whether the introduction of an intercept for different cross section units in order to account the heterogeneity across banks are significant.

The restricted F-test and x^2 test of fixed effect are significant. They confirm that fixed effect model is more reliable capturing the information about what contributes to the difference across banks. Thus the model can capture the information of what contributes to the differences across banks. Please refer to appendix C for detail statistical results on redundant fixed effects tests.

Table 9 provides complete information about the estimation results of the reduced-form revenue equation. The H-statistics for all banks is .69. The F test shows that the value is significantly different from zero thus it rejects the monopoly hypotheses. It is also significantly different from one, thus it also rejects the perfect competition hypotheses. We can conclude

Table 9. **Empirical Results using Fixed Effect Model Interest Income as Dependent Variable,** **All Banks between 2001 and 2009**				
	All Banks	**Large Banks**	**Medium Banks**	**Small Banks**
Funding rate	0.46***	0.49***	0.51***	0.46***
	(34.74)	(18.56)	(28.52)	(24.50)
Wage rate	0.21***	0.08***	0.26***	0.19***
	(11.52)	(2.53)	(10.10)	(7.50)
Capital price	0.02	0.01	0.03***	0.018
	(1.50)	(0.40)	(2.12)	(0.88)
Risk of loans	0.45***	0.17	0.52***	0.457***
	(14.04)	(1.20)	(11.51)	(9.41)
Risk of capital	0.002	0.18***	0.10***	-0.028
	(0.19)	(2.68)	(4.02)	(-1.83)
Deposit Mix – Demand Deposit	0.03***	0.025	0.007	0.02
	(2.06)	(0.81)	(0.33)	(1.29)
Deposit Mix – Interbank Deposit	-0.001	-0.021***	-0.003	0.001
	(-0.60)	(-2.17)	(-0.97)	(0.40)
Other Income	-0.008	0.04	-0.022	-0.010
	(-0.83)	(1.54)	(-1.64)	(-0.77)
Number of observation	892	63	309	520
R^2	0.89	0.94	0.94	0.87
H (competition) Market structure	0.69[a] Monopolistic Competition	0.59[a] Monopolistic Competition	0.80[a] Monopolistic Competition	0.66[a] Monopolistic Competition

a) the value of F test shows that H is not significantly different from 0 and 1 (level confidence 99%)
The value in the bracket is the t-statistic;
*** Significant at 99% confidence level; ** significant at 95% confidence level; * significant at 90% confidence level

that the banking sector is working under monopolistic competition. The changes in factor price will increase the revenue less than proportionally because the products are differentiated and a switching cost is high. Further, competition has risen over time. This conclusion was based on a comparison of our findings with the study conducted by Classens and Laeven (2003). According to them, from 1994 to 2001, the H-statistic for Indonesia banking was .62.

The across groups analysis provides broader understanding of the market. The H-statistics vary from .59 to .80 suggesting that the banking market across all groups was working under monopolistic competition. The large banks groups was the least competitive market, with the H-statistics .59. The medium banking group was the most competitive market. The H-statistic for the medium bank group is quite high (.80), and it is comparable with the banking market in developed countries and other emerging market such as Latin American bank (Yeyati and Micco, 2007). It is quite surprising as in other countries including Europe; the banking market of larger banks is more competitive than that of the smaller banks which usually service the local market (Bikker and Haaf, 2002).

As expected, deposits or funds are the most important input. The coefficient for the funding rate is the main contributor of the elasticity. This figure is consistent across different groups. Human resources are the second main input in the banking industry. The sign of the coefficients are also positive indicating that the increase in the wage rate is transmitted into the revenue. The least important input is capital. The coefficients on the capital price are small, and in some estimates, they are not significant.

Risk of loans is an important explanation of the pattern of revenue. Positive coefficients for risk of loans imply that banks with a higher proportion of loans on their balance sheets generate higher interest revenue per rupiah of asset. A similar conclusion is also applied to the risk of capital variable. The coefficients are positive for large and medium banks. Thus in the larger banks, it can be concluded that the higher portion of equity per asset earns higher revenue. The deposit mix variables are not really significant in explaining the movement of revenue, except the proportion of interbank deposits to total deposits in the large banks market. The sign of the coefficient is negative which implies that the bigger the portion of interbank deposit to total deposits, the less revenue that might be earned.

4.2. Market Structure and Competition

This section will describe the relationship between concentration and competition. The study will employ two-frequently applied types of such indices as a proxy of market concentration. The first index is called k-banks concentration ratio (CRk) which takes the market shares of the

k biggest banks in the market, and ignoring the remaining banks. The second index is Herfindahl-Hirschman index (HHI), which takes market shares as weights, and stresses the importance of larger banks by assigning them a greater weight than smaller banks (Bikker and Haaf, 2002)[6].

These concentration measurements can be considered reliable for assessing market concentration. As all proxies produces similar outcomes. The data shows that the banking market in Indonesia has become less concentrated. This finding is surprising. Unlike the developed countries where consolidation increased the market concentration[7], policy changes reduce the concentration in the Indonesia banking market.

Our findings are aligned with a study conducted by Gelos and Roldos (2002). They argued that consolidation did not increase market concentration in Asian countries because the structural changes were mostly driven by government. While in the developed countries and more mature markets of developing countries in Latin America, mergers and acquisitions were driven by the market.

In those markets, tight competition forced large banks to merge to enhance their competitiveness. On the contrary, mergers and acquisitions in Indonesia banking were mostly

Figure 4.
The Banking Concentration by Using Four Different Measurements
All Banks, 2001 - 2009

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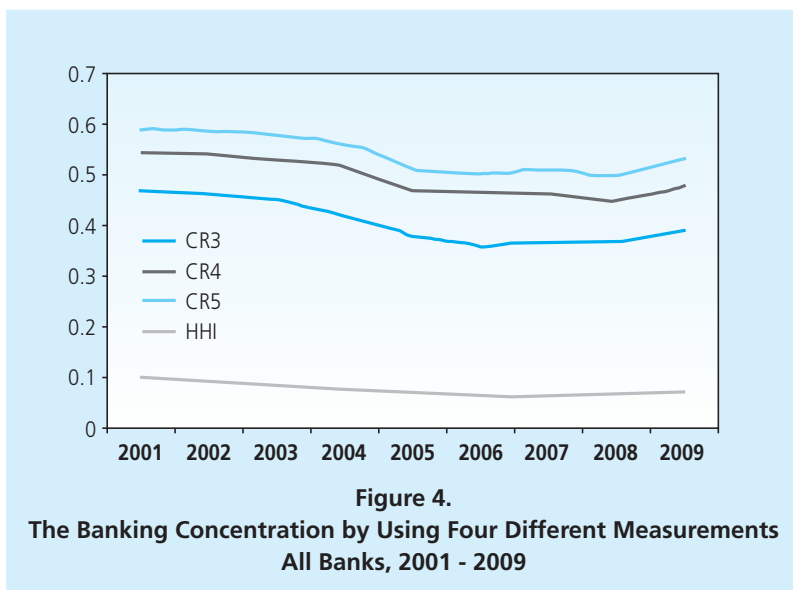
6 The following are formulas to calculate the concentration ratio (CR)and Herfindahl-Hirschmanindexes, where s is market share of banks.

$$CR_k = \Sigma_{i=1}^{k} \; si \qquad\qquad HHI = \Sigma_{i=1}^{m} \; s_i^2$$

7 Please refer to De Bandt and Davis (2000) and Bikker and Haaf (2002).

conducted by medium-sized and smaller banks in order to comply with the Single Presence Policy and Minimum Capital Requirement. These consolidations increased the scale of economies of the merging banks. However it did not increase industry concentration because the mergers were dominated by small and medium-sized banks. It implies that consolidation in the Indonesian banking market does not create more concentrated markets but it improves the market share distribution.

In the case of large banks, the Single Presence Policy has effectively reduced concentration by the consolidation of PT Bank Niaga Tbk. and Bank Lippo in 2008. The market share of the merged bank, PT. CIMB Niaga, increased about 3 percent. This merger significantly reduced the market concentration because the new merge bank was not in the top three large banks. Therefore as the share of merge bank increased, the market share distribution was changed where the share of biggest three banks decreased from 74 percent in 2001 to 66 percent in 2009.

The mergers and acquisitions in the medium-sized and small banks market aimed to improve the banks' performance after the 1997 economic crisis or to comply with the Single Presence policy or Minimum Capital Requirement policy. There were seven mergers in the medium-size banks category between 2001 and 2009. The number of banks in the small group also reduced. The consolidation in small banks market was dominated by the liquidations of banks with poor performance and consolidation to comply with the Minimum Capital Requirement policy. Please refer to table 3 for a detail list of merger between 2001 and 2009.

Table 10. The Banking Concentration across Groups 2001 - 2009								
Year	**All Banks**		**Large Banks**		**Medium-sized Banks**		**Small Banks**	
	CR3	HHI	CR3	HHI	CR3	HHI	CR3	HHI
2001	0.47	0.10	0.74	0.24	0.30	0.06	0.35	0.05
2002	0.46	0.10	0.74	0.23	0.30	0.06	0.30	0.04
2003	0.45	0.09	0.73	0.22	0.27	0.05	0.30	0.04
2004	0.42	0.08	0.71	0.21	0.26	0.05	0.29	0.05
2005	0.38	0.07	0.67	0.20	0.25	0.05	0.33	0.05
2006	0.36	0.06	0.65	0.17	0.23	0.05	0.29	0.05
2007	0.37	0.07	0.64	0.18	0.23	0.04	0.30	0.05
2008	0.37	0.06	0.64	0.18	0.23	0.04	0.32	0.06
2009	0.39	0.07	0.66	0.18	0.24	0.05	0.28	0.05
Average	**0.41**	**0.08**	**0.69**	**0.20**	**0.26**	**0.05**	**0.31**	**0.05**

Compared to large banks, the medium-sized and small banks have a much lower degree of concentration. They have a better market share distribution, as the biggest three banks in the group only controlled less than 35 percent of the market share. Analogous with the large banks, the concentration level in medium-sized banks and small banks has also reduced. But if we compare the value of the concentration changes, the changes of the concentration level in medium-sized banks and small banks were relatively smaller, especially if we refer to Herfindahl-Hirschman index. The information of the market concentration and competition in the medium-sized banks and small banks helps in understanding this phenomenon. The medium-sized and small banks markets were highly competitive and less concentrated, therefore the mergers and acquisitions just slightly reduced the market concentration.

There is a consistency between market concentration and competition in the three different groups. Larger banks have the lowest degree of competition because the market is more concentrated ($CR3_{average}$=0.69; $HHI_{average}$=0.20). On the other hand, the market of medium-sized banks is the most competitive because it is less concentrated ($CR3_{average}$=0.26; $HHI_{average}$=0.05). Small banks also work in a quite competitive environment because each bank has a small share of the total market ($CR3_{average}$=0.31; $HHI_{average}$=0.05).

Table 11. Empirical Results using Fixed Effect Method with Interaction Variables (All Banks between 2001 and 2009)	
	Rincian
H (Competition Level)	0.68
ΔH (After 2004 Consolidation Policy)	0.027
Significance test on ΔH , F test¡	3.5074240.0615*
Test of change in H	Can not reject the increasing of H-statistics
Market Structure	Monopolistic Competition
N (Number of Observation)	892

Note: *** significant at 99% confidence level; ** significant at 95% confidence level;
   * Significant at 90% confidence level

The outcome of fixed effect model using the interaction variables for all banks implies that the second wave of consolidation through the introduction of Indonesia Banking Architecture increased the value of H-statistics. It increases about 0.027 from 0.68 in the first period to 0.70 in the second period. The significance test by using F test shows that the increase on the level of competition is significant at 90 percent of confidence level. The result confirms that the consolidation policies enhanced the competition in the Indonesia banking industry. Consolidation

policies were effective to encourage medium-sized and small banks to merge in order to comply with the Minimum Capital Requirement or Single Presence Policies. It significantly increased the scale of economies of the merging banks and equipped them with bigger capacity to compete with other banks. Further the mergers of smaller banks improved the distribution of the market share. The improvement of the market share distribution reduced the market concentration and enhanced the competition.

V. CONCLUSION

There are some interesting findings of this study. First, the data implies that the structure of Indonesia banking market is vulnerable. Comparing to other East Asian countries, the number of bank in Indonesia is larger. However, the market is concentrated in a few banks. Large banks control a substantial share of the market. On the other hand, more than a half of banks are small with the equity less than 1 trillion rupiah. In addition, the market concentration in the large banks group is much higher than in smaller banks.

Secondly, banking market has become less concentrated during the implementation of consolidation policy. This finding showed that the consolidation policy in Indonesia has similar pattern with those implemented in other Asian countries. On the contrary, consolidation policy in Latin American countries and other developed countries increased the market concentration. As described by Gelos and Roldos (2002), the consolidation policy that was driven by market will increase the concentration. On the other hand, the consolidation policy in Indonesia was driven by the authority through the banks liquidation, mergers of the State Owned Bank and the implementation of the Indonesia Banking Architecture. They have effectively encouraged medium-sized and small banks to consolidate. This improved the distribution of market share and reduced the market concentration.

Thirdly, during the implementation of consolidation policy the banking industry was working under monopolistic competition. The H-statistic was .69. If we compare to the value of H-statistic within 1994-2001 as calculated by Claessen and Laven (2003), the competition has risen over time. The competition analysis by sub-groups shows that large banks were working in the least competitive market while the medium-sized banks are working under the most competitive market. The nature of competition in Indonesia banking was different with developed countries where large banks were more competitive (Bikker and Haaf, 2002).

Next finding is discussing the impact of consolidation policy on competition. The estimation shows that banking industry was more competitive in the second period of the implementation

of the consolidation policy. The increasing of the economies scale of the merging banks and the improvement of market share distribution enhanced the competition.

Finally the study demonstrates that a concentrated market contributes to a less competitive environment. It is possibly the reason why the large banks in Indonesia are working in a less competitive market rather than the smaller banks. Large banks possess monopoly power to enable them to behave as monopolist or oligopolies.

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Appendix A. Alternative Specification, Empirical Results Polled Regression Model of Fixed Effect Method, Total Revenue as Dependent Variable (All Banks between 2001 and 2009)				
	All Banks	**Large Banks**	**Medium Banks**	**Small Banks**
Funding rate	0.43***	0.43***	0.40***	0.46***
	(35.05)	(19.02)	(23.65)	(29.85)
Wage rate	0.17***	0.065***	0.21***	0.14***
	(10.30)	(2.13)	(8.91)	(6.93)
Capital price	0.067***	0.01	0.04***	0.05***
	(5.32)	(0.58)	(2.60)	(3.01)
Risk of loans	0.39***	0.08	0.41***	0.41***
	(13.34)	(0.66)	(10.50)	(10.21)
Risk of capital	0.037***	0.16***	0.09***	0.02
	(3.10)	(2.69)	(4.00)	(1.52)
Deposit Mix - Demand Deposit	0.03***	0.04	0.001	0.02
	(2.61)	(1.22)	(0.08)	(1.63)
Deposit Mix - Interbank Deposit	-0.005***	-0.022***	-0.008***	-0.003
	(-2.52)	(-2.66)	(-2.55)	(-1.26)
Other Income	0.12***	0.16***	0.15***	0.08***
	(13.19)	(7.85)	(11.90)	(7.48)
Number of Observation	892	63	309	520
R^2	0.87	0.94	0.93	0.86
H (Competition)	**0.66[a]**	**0.51[a]**	**0.65[a]**	**0.66[a]**

a) the value of F test shows that H is not significantly different from 0 and 1 (level confidence 99%) The value in the bracket is the t-statistic.
*** significant at 99% confidence level;
** significant at 95% confidence level;
* significant at 90% confidence level

Appendix B. The Equilibrium Test – Return on Asset as dependent variable	
	All Banks
Funding rate	-0.067
	(-1.55)
Wage rate	0.16
	(2.63)
Capital price	-0.074
	(-1.52)
Risk of loans	-0.70
	(-6.16)
Risk of capital	0.004
	(0.095)
Deposit Mix – Demand Deposit	0.093
	(2.06)
Deposit Mix – Interbank Deposit	-0.028
	(-3.26)
Other Income	0.19
	(5.61)
Number of observation	862
R^2	0.75
H (competition)	0.024[a]
Equilibrium test	
F test	0.072
ρ (1,742)	0.789

H = 0 cannot be rejected (level confidence 99.9%)
The value in the bracket is the t-statistic.

Appendix C. Redundant Fixed Effects Tests				
	All Banks	**Large Banks**	**Medium Banks**	**Small Banks**
F-test	13.73	9.42	20.27	9.42
df (degree of freedom)	(112;771)	(6;48)	(35;265)	(69;442)
x^2 statistics	978.28	49.04	NA	470.23
df (degree of freedom)	(112)	(6)	(NA)	(69)
Number of Observation	892	63	309	520

H = 0 is (level confidence 99.9%)

Appendix D. Empirical Results of Polled Regression Model of Fixed Effect with Time Dummies All Banks between 2001 and 2009				
	All Banks	**Large Banks**	**Medium Banks**	**Small Banks**
Funding rate	0.43***	0.53***	0.41***	0.48***
	(24.73)	(9.62)	(17.87)	(17.61)
Wage rate	0.23***	0.033	0.28***	0.18***
	(12.62)	(0.61)	(9.96)	(7.18)
Capital price	0.028***	-0.0025	0.06***	0.015***
	(2.1)	(-0.063)	(3.34)	(0.76)
Risk of loans	0.42***	0.0008	0.40***	0.46***
	(12.70)	(0.0061)	(9.51)	(9.15)
Risk of capital	0.016	0.21***	0.19***	-0.024
	(1.25)	(2.30)	(6.73)	(-1.56)
Deposit Mix – Demand Deposit	0.0009	0.03	-0.046	0.011
	(0.069)	(0.77)	(-1.94)	(0.62)
Deposit Mix – Interbank Deposit	0.00045	-0.028***	0.0005	0.002
	(0.178)	(-2.75)	(0.124)	(0.70)
Other Income	-0.0004	0.064	-0.042***	-0.015
	(0.177)	(1.66)	(-2.82)	(0.70)
Number of observation	892	63	309	520
R^2	0.90	0.95	0.94	0.87
H (competition)	**0.69[a]**	**0.55[a]**	**0.76[a]**	**0.68[a]**

a) the value of F test shows that H is not significantly different from 0 and 1 (level confidence 99%)
The value in the bracket is the t-statistic.
*** significant at 99% confidence level;
** significant at 95% confidence level;
* significant at 90% confidence level

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