

## Competitive Condition and Market Power of Islamic and Commercial Conventional Banks in Indonesia

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**Abstract** The expansion of the Islamic banking industry seems to accentuate the banking competition in Indonesia where conventional and Islamic banks coexist. In addition, the global financial crisis of 2007/2008 and deregulation have the effect on competitive conditions of the banking sector in Indonesia. In this context, this study aims at examining the competitive conditions and the market power of both types of banks over the period 2006-2013. The study also attempts to identify the factors that determine market power of the banking sector. Using samples of 27 Islamic banks and 106 conventional banks, the study applies a variety of structural and non-structural measures related to the traditional approach and the new empirical approach of the industrial organization. The methodology is based on set of measures of the competition and market power. The first measure is a set of concentration ratios and Herfindahl-Hirschman index. The second measures are the Panzar - Ross model and the Lerner index based on econometric estimations with the aim at evaluating the market structure and measuring its power in terms of price setting. The results of the competition analysis suggest that the banking markets of Indonesia cannot be characterized by the bipolar cases of either perfect competition or monopoly. That is, banks earned their revenues operating under conditions of monopolistic competition in that period. Overall, Islamic banks in Indonesia operate in a relatively less competitive environment compared to conventional banks, or in other words, market power is higher in Islamic markets compared to conventional commercial markets

**Keywords:** Islamic banks, Market structure, Bank competition, Profitability.

### 1 Introduction

The Islamic banking industry is considered as a new shape of financial intermediation. Different from conventional system, the relationship between the Islamic banks and its customers is based on mutual trust, strengthened by shared religious beliefs. These banks offer products in accordance with Islamic principles that encourage trade and productive investment.

The development of Islamic banking in Indonesia is a non-separate part of the development of the national banking system as stated in a grand design of Indonesian Banking Architecture (IBA). Following its launching on January 9, 2004, this strategic plan has enabled the Central Bank of Indonesia to pay more serious attention

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on the development of Islamic banking. Finally, the enactment of Act No.21 of 2008 issued July 16,2008 has provided a more adequate legal base to the development of Islamic banking in Indonesia, and consequently has accelerated the growth of the industry.

After the implementation some financial deregulation and the emergence of the IBA, which was supported by the strengthening of the capital structure of banks, would result in stronger national banks that would eventually be able to increase the competition among banks operating in Indonesia. The competition, which encourages increased competitiveness, is the main foundation of the process of strengthening the national banking system. Therefore, changes in the level of competition among banks will also change the behavior and the conduct of the banking business.

In addition to financial deregulation factor, competitive environment of the banking system in Indonesia has changed since financial crises. The global financial crisis in 2007/2008 has proven that instability in the banking sector has a significant consequence to the whole economy due to its dominant position in the financial sector of the country. The vital role of the sector makes the study of competition in the banking sector very important.

In the banking literature, there are two major empirical approaches for assessing the degree of competition: the structural approach and the non-structural approach. The structural approach to modeling competition follows the structure-conduct-performance (SCP) paradigm. The SCP paradigm assumes that banking firms' market power increases with industrial concentration and thus establishes a direct link from industry structure to competitive conduct. An increase in concentration is regarded as increasing collusive opportunities between banks, and hence would lead to higher prices and profitability (Yildirim 2002). The SCP examines the competition conditions by using ratios of concentration of largest firms (CR) and Herfindahl-Hirschman index (HHI) index that characterize market structure.

On the other hand, the structural approach, the non-structural approach is based on The New Empirical Industrial Organization (NEIO). This approach measures competition without using explicit information about the structure of the market. Instead, non-structural measures focus on obtaining estimates of market power from the observed behavior of banks. This approach states that high efficiency of the bank helps in increasing its market share and realizing profits. The competition measures used are the PR-H statistic of Panzar and Ross (1987) which provide an aggregate measure of competition, and the Lerner index which provide an individual measure of market power. The calculation of PR-H offers a means of discrimination between the different market structures through the reduced of the function at the individual income of the bank. Meanwhile, The Lerner Index measures the degree of market power by focusing on the pricing power apparent in the difference between price and marginal cost (Jimenez et al. 2007). It captures the degree to which a firm can increase its marginal price beyond marginal cost, and represents a more accurate indicator of market power compared to standard concentration measures. Higher values of the Lerner index imply lower levels of bank competition (Sahut et al. 2012)

Several studies have assessed competitive conditions in the banking industry in different countries where the Islamic banks are in competition with conventional banks. Among others the existing studies on this topic conducted by Abdul Majid and Sufian (2007), Al-Muharrami et al. (2006), Turk Ariss (2010), Weill (2010), Sahut, et al. (2012), and Hamza and Katctouli (2014).

This study contributes to the literature by comprehensively examining the competitive environment of the Islamic and conventional banking system in Indonesia over the period 2006-2013. The international financial crisis and measures taken by Indonesian Government as a response to the crisis could have an impact on the competitiveness of the system. In terms of the recent financial crisis this study investigates how Islamic and conventional banking reacted to changes in the competitive environment after the crisis. This study thus examines and compares the competitive environment between Islamic banks and conventional banks. For each type of bank, the aim of comparison is to identify the factors that express market power for banks to better study the degree of competition in both banking markets in Indonesia.

The remainder of this paper is structured as follows: Section 2 presents the literature review of competition of banks. Section 3 details methodology used in this study. The data and empirical results of the study will be presented in Section 4. Section 5 concludes.

## 2 literature review

The SCP paradigm, originally developed by Mason (1939) and Bain (1951), posits a one-way causality relationship from industry structure to firm conduct, and from firm conduct to industry performance. Under the SCP framework, market structure determines firm or industry conduct, and conduct, in turn, determines firms and industry performance, which typically is measured by profits or price-cost margins. In this approach industry performance and concentration are often measured by some form of profit ratio, a concentration ratio (CR), and the HHI. SCP paradigm is criticized on the assumption that causality is from structure to performance, although it is argued that conduct and performance can affect market structure. Also, the limit of the traditional measures is that the calculation of the degree of competition is done from indirect proxies such as market structure or market shares. Claessens and Laeven (2004) find that the actual behavior of banks is related not only to market structure but also to other factors like entry barriers, barriers on foreign ownership and activity restrictions which can limit the degree of competition.

On the other hand, the non-structural approach measures competition without using explicit information about the structure of the market. Instead, non-structural measures focus on obtaining estimates of market power from the observed behavior of banks. This measures of competition often require a model of a banking firm to specify the output and input. In the literature, two main approaches may be identified, namely, *the production approach* and *the intermediation approach*. Under the *production approach*, financial institutions are thought of as primarily producing services for account holders. Another approach is the *intermediation approach* that consider a bank as an intermediary between depositors and borrowers. A bank employs labor and physical capital to attract deposits, which are used to fund loans. In addition to labor and physical capital, deposits are considered as an input. Bank output is often defined as total assets, or total loans. This paper keeps the traditional intermediation approach.

Under the non-structural framework, a concentrated banking industry can behave competitively if the barriers for new entrants to the market are low. It is based on theory, called the Contestable Markets Theory, developed by Baumol and Wilig

(1982). Among non-structural measures, are two widely-used model in banking sector, namely the Panzar-Rosse model and the Lerner index.

A number of studies have applied the non-structural approach to banking sector competition. Shaffer (1982) was the first to apply the PR model to the banking industry and found monopolistic competition for a sample of two under samples of American banks. The first one observed during the period 1941-1975 and the second during the period 1941-1983. The next empirical study used the PR model was conducted by Nathan and Neave (1989) for the Canadian banking system and found perfect competition for 1982 and monopolistic competition for 1983-1984. Lloyd-Williams et al., (1991) and Molyneux et al. (1996) revealed perfect collusion for Japan. Molyneux et al. (1994) evaluated the P-R statistic on a sample of French, German, Italian, Spanish and British banks for the period 1986-1989 in order to evaluate the competitive conditions in major EC banking markets. Their findings indicate that values for H which is not significantly different from zero and from unity for France, Germany (except for 1987), Spain and the UK, thus pointing to monopolistic competition. The H-statistic for Italy during 1987-1989 is negative and significantly different from zero; as a result, it was impossible to reject the hypotheses of monopoly. Coccorese (1998), however, who also intends to assess the degree of competition in the Italian banking sector, finds significantly non-negative values for H-statistic. Vesala (1995) applies the model to the Finnish banking industry (1985-1992) to investigate the competition and market power in the Finnish banking industry. De Bandt and Davis (2000) utilizing data of small banks in Germany and France found monopolistic competition for large banks and monopoly. Buchs and Mathisen (2005) with similar results found evidence of a noncompetitive market structure in the Ghanaian banking system.

Referring to the competitive condition of the Indonesian banking industry, only few studies have been found. Among others are Classens dan Laeven (2003), Setyowati (2004), Mulyaningsih and Daly (2011). They found that Banks in Indonesia operate under monopolistic competition. Widyastuti and Armanto (2013) also performed research on Indonesian banking competition using PR method and Panel data regression to estimate the the changes of competition's level due to the introduction of the Indonesian Banking Architecture (API) in 2004. They found that competition in banking decreased after the introduction of API, with a large tendency to monopoly or collusive oligopoly.

The studies that have focused on assessing competitive environment of Islamic banks operating side by side with conventional banks still are rare. In This context Abdul Majid and Sufian (2008) investigated the market structure of the Islamic banking industry in Malaysia during 2001-2005 and evaluated the degree of competition using the PR model. The result suggested that the Islamic banks in Malaysia earned their revenue in the condition of monopolistic competition.

Turk Ariss (2010) analyzed the competitive conditions prevailing in Islamic and conventional global banking markets in the MENA countries utilizing the Panzar-Rosse (PR) and the Lerner index model a with sample of 58 Islamic banks and 192 conventional banks for the period 2000-2006. The results indicate the ratios of concentrations are three times higher for Islamic banks; it means that Islamic banks allocate a greater share of their assets to financing activities compared to conventional banks. While based on the Lerner index, Islamic banks have market power higher than their peers (conventional banks). In the same lineage, Weill (2010) examine a sample of banks for 17 countries in the MENA region and South East Asian countries to compare the market power between Islamic banks and conventional banks for the

period 2000-2007. By using the Lerner index, the result suggests that the Islamic banks have less market power than the conventional banks. Meanwhile, A test of robustness with the PR model confirms that the Islamic banks are not less competitive than their conventional peers.

Subsequently, Sahut et al. (2012) studied the factor of competitive conditions of conventional and Islamic banks operating in the same market in the MENA region. They determined the level of competitiveness between the two types of banks by using the PR-H statistic of Panzar and Ross (1987) and the Lerner index. The results of this study suggested that banking sectors in MENA operate under monopolistic competition. In addition, their findings confirm that Islamic banks are significantly more competitive than conventional banks and they express a higher degree of market power. That profitability significantly increases with market power is also shown in this study, but this does not warrant higher profitability levels for Islamic banks.

The recent study on the Islamic banking industry was conducted by Hamza and Kachtouli (2014). They investigated the competitive conditions and the market power of the conventional and Islamic banks during the period 2004-2009 in MENA and Southeast Asia region. Using a variety of structural and non-structural measures the authors related those approaches to the traditional approach and the new empirical approach of the industrial organization. The findings of this study show that the HHI index for both markets are low concentrated, while according to the concentration ratios, the Islamic market is considered as moderately concentrated. The estimations results, through the H-PR-statistic of PR related to degree of competition and the Lerner index of market power, demonstrate that both markets are characterized by a monopolistic competition and the Islamic banking expressed a high degree of market power.

### 3 Methodology

The methodology is based on set of measures of the competition and market power. The first measure is a set of concentration ratios (CR) and HHI index. The second measures are the PR-H statistic and the Lerner index based on econometric estimations with the aim of evaluating the structure of market and measuring its power in term of price setting.

To study the market power of Islamic banks and the determinants of their competitiveness in Indonesia, I utilize a two-step procedure. In the first step I measure the competition of Islamic and conventional banks and I identify the market power of each of them by the PR-H statistic and the Lerner index. In the second step I study the impact of the recent global financial crisis and deregulation on the degree of banking competitiveness.

#### 3.1 Indicators of concentration

According to the traditional approach (SCP), the competition can be measured by the indications of concentrations or by the HHI. These two measures were widely applied before 1990s and based on the market share.

### 3.1.1 The k bank concentration ratio

Simplicity and limited data requirements make the k bank concentration ratio one of the most frequently used measures of concentration in the empirical literature. Summing only the market shares of the k largest banks in the market, it takes the form:

$$CR_k = \sum_{i=1}^k S_i$$

CR gives equal emphasis to the k leading banks, but neglecting the many small banks in the market. There is no rule for the determination of the value of k, so the number of banks included in the concentration index is a rather an arbitrary decision. The concentration ratio may be considered as one point on the concentration curve, and it is a one-dimensional measure ranging between zero and unity. The index close to zero for an infinite number of equally sized banks and it equals unity if the banks included in the calculation of the concentration ratio make up the entire industry

### 3.1.2 The Herfindahl-Hirschman Index

The HHI is another traditional measure of the competition and the concentration of the market conceived by Hirschman (1945) and Herfindahl (1950). Since 1982, the US Department of Justice has based its merger guidelines on this index. It is then widely applied to estimate the level of competition of a market and its structure:

$$HHI = \sum_{i=1}^n S_i^2$$

where  $S_i^2$  is the market shares of the company i and n is the number of companies. This indicator is calculated by adding the squares of the market shares of every bank in the market or a country and it varies between zero (situation of pure and perfect competition) and 10,000 ( $100^2$ : monopoly position). The more the value of the indication increases, the more the market is concentrated, and weaker is the competition between the agents. The market thus aims towards a monopoly position and an increase of the power of market. The decrease indicates the opposite.

According to the current screening guidelines in USA, the banking industry is regarded to be a competitive market if the HHI is less than 1,000, a somewhat concentrated market if the HHI lies between 1,000 and 1,800, and a very concentrated market if HHI is more than 1,800. If the post-merger market HHI is lower than 1,800 points, and the increase in the index from the pre-merger situation is less than 200 points, the merger is presumed to have no anticompetitive effects and is approved by the regulators.

## 3.2 Panzar and Rosse (PR) Model

Panzar and Rosse (1987) developed a test examining if the behavior at the level of companies is in accordance either with the model of perfect competition, the model of

monopolistic competition or the model of monopoly. This test is based on the empirical examination of the impact of the prices variations of the inputs on the income of the firm. It is obtained by the sum of the price elasticity of the inputs (*H-statistic*).

The H-statistic is estimated from a reduced form bank revenue equation as the sum of the elasticity of the total revenue of the banks with respect to the bank's input prices. The H-statistic varies between 0 and 1, with less than 0 being monopoly, less than 1 being monopolistic competition and 1 being perfect competition.

**Table 1** Interpretation of the Rosse-Panzar *H*-Statistic

Estimated H statistic	Competitive Environment test	Equilibrium test
$H \leq 0$	<ul style="list-style-type: none"> <li>• Monopoly equilibrium</li> <li>• Perfect colluding oligopoly</li> <li>• Conjectural variations short-run oligopoly</li> </ul>	$H < 0$ Disequilibrium $H = 0$ Equilibrium
$0 < H < 1$	Monopolistic competition free entry equilibrium	
$H = 1$	<ul style="list-style-type: none"> <li>• Perfect Competition</li> <li>• Natural Monopoly in a perfectly contestable market</li> <li>• Sales maximizing firms subject to break even constraint</li> </ul>	

Source: Panzar & Rosse, 1987; Nathan & Neave, 1989; Shaffer, 1993; and Molyneux et al., 1994

Similar to several cross-country studies such as Claessens and Laeven (2004) and Bikker et al. (2007), I use the following reduced form log-linear revenue equation which is a variation of the Panzar and Rosse (1987) methodology:

$$\ln TR_{it} = \alpha + \beta_1 \ln W_{1it} + \beta_2 \ln W_{2it} + \beta_3 \ln W_{3it} + \beta_4 \ln Z_{1it} + \beta_5 \ln Z_{2it} + \beta_6 \ln Z_{3it} + \varepsilon_{it} \quad (1)$$

The dependent variable  $TR_{it}$  indicates total revenues measured by the ratio of interest and non-interest revenues to total assets, following Nathan and Neave (1989), Casu and Girardone (2006) and Habte (2012). Equation (1) includes three input prices:  $W_1$  is a proxy for input price of deposits. It is the ratio of total interest expenses to total deposits and money market funding.  $W_2$  is a proxy for input price of equipment and other fixed capital. It is the ratio of other operating expenses over total assets.  $W_3$  is a proxy for input price of labor. It is the ratio of personnel expenses over total assets. The analysis includes other bank-specific control variables to capture bank-specific effects, three control variables are included in the equation (3).  $Z_1$  represents the ratio of net loans to total assets to capture the risk component,  $Z_2$  stands for total assets to account for possible scale economies, and  $Z_3$  denotes the ratio of equity to total assets to capture the impact of capitalization;  $\varepsilon_{it}$  is a random disturbance term. The subscripts  $i$  and  $t$  refer to bank  $i$  operating at time  $t$ . It consistent with Molyneux, Thoronon, Lloyd and Williams (1996), Gelos and Roldos (2004) and Claessens and Laeven (2004),

The application of the PR framework to banking requires three assumptions. First, banks are single product firms that produce interest revenues using labor, capital, and deposits as inputs (De Bandt and Davis, 2000); second, higher factor prices do not correlate with higher revenues generated by higher quality services; and

third, banks are profit-maximizing firms with normally shaped cost and revenue functions (Gelos and Roldos, 2004). More importantly, banks should be observed from a long-run equilibrium perspective, for which this study tests using the following equation :

$$\ln ROA_{it} = \alpha + \gamma_1 \ln W_{1it} + \gamma_2 \ln W_{2it} + \gamma_3 \ln W_{3it} + \gamma_4 \ln Z_{1it} + \gamma_5 \ln Z_{2it} + \gamma_6 \ln Z_{3it} + \varepsilon_{it} \quad (2)$$

where  $ROA_{it}$  is the ratio of pre-tax profits to total assets that measures a bank's return on assets. The subscript  $i$  denotes bank  $i$ , and the subscript  $t$  denotes year  $t$ . All the variables in the right-hand side of the equation are similar to the variables in equation (3). The equilibrium statistic,  $E$ , is the sum of input price elasticities, i.e.  $E = \gamma_1 + \gamma_2 + \gamma_3$ . The interpretation of this statistic is as follows: a value of  $E$  significantly different from zero implies that the market is not in equilibrium because in the long-term, the variation of the yields on assets does not relate to the variation of the prices of the inputs. However, in the presence of positive values of the PR-H statistics, Shaffer (2004) underlines that the rejection of the test of equilibrium does not distort the inferences based on the results of the estimation of this indicator. He also underlines that the no equilibrium suggests that the industry develops dynamically.

### 3.3 The Lerner index and the Power of Pricing

The market power can be considered as the capacity to sell products over the marginal cost. The Lerner index is one of the most popular and the oldest indexes of market power. It is a direct measure of competition through the distance between the price and the marginal cost. The Lerner index ( $LI$ ) is computed using the formula as follows:

$$LI = \frac{(P - MC)}{P}$$

where  $P$  is the price of banking outputs and  $MC$  is the marginal cost. Following the approach in de Guevara, Maudos and Perez (2005 ; 2007) and Berger et al. (2008), we proxy bank output by using Total assets,  $P$  is calculated as total bank revenues over assets, and  $MC$  is calculated by taking the derivative from a translog cost function shown in equation (3):

$$\ln TC_{it} = c_i + \mu_t + \sum_{j=1}^3 \theta_j \ln w_{j,it} + \theta_4 \ln TA_{it} + \frac{1}{2} \sum_{k=1}^3 \sum_{l=1}^3 \phi_{kl} \ln w_{k,it} \ln w_{l,it} + \frac{1}{2} \rho_1 (\ln TA_{it})^2 + \sum_{k=1}^3 \tau_k \ln w_{k,it} \ln TA_{it} + u_{it} + \varepsilon_{it} \quad (3)$$

Where  $TC$  is the total operating plus financial costs;  $TA$  (i.e. Total assets) is a measure of bank production.  $W_1$ ,  $W_2$ , and  $W_3$  are the same input prices used in equations (1) and (2) and defined above. Finally,  $i$  denotes banks and  $t$  denotes years,  $\alpha$  denotes bank-level fixed effects and  $\varepsilon$  is an error term.

The estimated coefficients of the cost function are then used for computing the marginal cost. Indeed, as the marginal cost is the derivative of total cost to output



(here total assets), it can be derived that the derivative of the logarithm of total cost to logarithm of output is the ratio of marginal cost to total cost multiplied by output. As a consequence, marginal cost is equal to the product of the derivative of the logarithm of total cost to output multiplied by the ratio of total cost to output).

$$MC_{it} = \frac{\delta TC_{it}}{\delta q_{it}} = \frac{TC_{it}}{q_{it}} \left( \delta_o + \delta_1 \ln q_{it} + \sum_{j=1}^3 \delta_{j+1} \ln W_{j,it} \right) \quad (4)$$

The Lerner index is generally between 0 and 1. Lerner index = 0: mean a perfectly competitive behavior and the firm has no market power. Lerner index close to 1: show the weakness of the competition at the price level and that the firm exercises a market power thanks to a higher mark-up. An increase of the index can be explained by two elements: either the price increase or a decrease of the marginal cost of the company. Generally the index provides positive values lower than the unit. However, it can register negative values which can be explained as a consequence of a very strong competition obliging the firms to propose a price lower than the marginal cost (Maudos and de Guevara, 2006), or they can correspond to the period of introduction on the market which is characterized by a very high rate of charges.

### 3.4 The Factors Expressing the Degree of Competitiveness

Identifying the factors that express the power of the market for banks is conducted in this study to better study on the degree of competition in banking markets in Indonesia. Based on a model utilized by Barth et al. (2007), Turk-Ariss (2008), Masood and Sergi (2011) and Sahut et al., (2012), the model are estimated following the equation given in the eq.5.

$$Comp_{it} = a + bC_i + e_i \quad (5)$$

Where variable Comp refers to the variable competitiveness. In this study we consider the statistical PR-H and the Lerner index are as a proxy for competitiveness. While  $C_i$  is a vector classified into two categories: control variables and structural variables. As control variables we consider the efficiency measured by the ratio of total deposit to total assets, profitability measured by ROA and ROE, and the capitalization measured by the ratio of total equity to total assets. The last variable included in this model is structure variable. The concentration as a structure variable is captured by Concentration Ratio (CR).

## 4 The Data

In this research all data were collected directly from financial reports and verified in Bank Indonesia and the Financial Services Authority (OJK) database during the period 2006-2013. This study exclusively focus on commercial banks, rural banks (Bank Perkreditan Rakyat) of conventional and Islamic are excluded. I obtain sample consists of 27 Islamic banks and 107 conventional banks operating across the country. This sample seems to be fairly representative because it includes 85 percent of banks operating in Indonesia.

Table 2 presents summary statistics of the variables used in the empirical analysis. The mean value and the standard deviation for the dependent variables, total revenue (TR), and return on asset (ROA) remain fairly stable throughout the sample period. It should be pointed out that the mean values for Total revenue (TR), total cost (TC), output (q), and are relatively high, which seemingly indicates that their sample is not biased toward large banks on the average terms. These variables exhibit high standard deviation units around the mean.

**Table 2** Summary statistics of the variables used in the empirical analysis

Variable	Islamic		Conventional	
	Mean	Std. Dev.	Mean	Std. Dev.
Total Revenue (TR)	234050.1	164526.0	1919359	533040.6
Total Cost (TC)	126609.3	82602.00	852367.4	174638.9
Output (q)	2716052.	1831522.	25205386	8483023
Total Assets (Z2)	2737096.	2005908.	26995021	9326503
Return On Assets (ROA)	0.017968	0.017970	0.027442	0.007953
Return On Equity (ROE)	0.260050	0.249350	0.226757	0.013249
Price of Deposits (W1)	0.026935	0.025895	0.027996	0.001405
Price of Capital (W2)	0.017328	0.015343	0.139212	0.044856
Price of Labor (W3)	0.017066	0.013657	0.012281	0.000697
Loans Ratio (Z1)	0.204451	0.170583	0.497743	0.066140
Capital Ratio (Z3)	0.093184	0.041453	0.118584	0.074859
Efficiency (TDTA)	0.770178	0.770127	0.755297	0.013598
Capitalization (EQTA)	0.063223	0.065768	0.111740	0.009500

Variables total revenue (TR), total cost (TC), output (q), and total assets (Z2) are expressed in million Indonesian Rupiah.

## 5 Empirical Findings

### 5.1 Traditional Indicators of Concentration and Competition

The estimation results of the HHI values are reported together with CR4 in Table 3 and Table 4 for conventional and Islamic banks respectively. Market concentration measured by both indicators are divided into three categories, namely assets, deposits and loans (financing).

For the conventional market, the average of the values of the ratio CR4 for the total assets, the total of the deposits and the total loans is situated between 10 and 49 percent. These values of concentration belong to the range (0-50 percent). All values do not exceed the 20 percent what implies that this market knows a high concentration

and a low fragmentation, in other words, in the conventional banking market each bank has an increased market shares. In the case of Islamic market, the average of the values of the ratio CR4 for the total assets, the total deposits and the total financing, vary between 16 and 87 percent and are higher than the values of the conventional market. These values indicate that the concentration of this market has a very high concentration and a very low fragmentation, this leads to conclude that the Islamic market knows still being dominated by very few banks even though there are some new entry banks.

**Table 3** Market concentration of the Indonesian banking system over the period 2006-2013

Year	Number of banks	HHI					
		Assets		Deposits		Loan (Financing)	
		Islamic	Convent.	Islamic	Convent.	Islamic	Convent.
2006	130	0.298845	0.058525	0.252226	0.031116	0.028832	0.010874
2007	130	0.278930	0.061675	0.244974	0.033603	0.033154	0.012604
2008	124	0.267796	0.056705	0.240342	0.029723	0.035330	0.015377
2009	121	0.222313	0.061749	0.199675	0.032796	0.025597	0.017368
2010	122	0.178656	0.057763	0.163723	0.039358	0.017847	0.013370
2011	120	0.239962	0.054920	0.227523	0.035749	0.016509	0.013424
2012	120	0.139388	0.053913	0.131121	0.034767	0.008523	0.014816
2013	120	0.133482	0.055804	0.118700	0.035128	0.010060	0.008943

**Table 4** Market concentration of the Indonesian banking system over the period 2006-2013

Year	Number of banks	CR4					
		Assets		Deposits		Loan (Financing)	
		Islamic	Convent.	Islamic	Convent.	Islamic	Convent.
2006	130	0.864921	0.473566	0.788033	0.337190	0.266865	0.202112
2007	130	0.844780	0.486705	0.786616	0.351274	0.279175	0.221182
2008	124	0.813626	0.467429	0.752714	0.327294	0.286420	0.243474
2009	121	0.764826	0.489421	0.703310	0.347828	0.248243	0.256127
2010	122	0.694886	0.471605	0.646839	0.388713	0.217587	0.219421
2011	120	0.813513	0.460251	0.776718	0.371479	0.202602	0.221305
2012	120	0.680431	0.454997	0.647972	0.365349	0.164521	0.230445
2013	120	0.638348	0.462841	0.588178	0.367020	0.164094	0.106880

In the case of conventional banks, HHI does not demonstrate a significant change along the period of study. It means that the trend of market concentration was not influenced remarkably by the global financial crisis of 2007/2008. This trend actually due to the successful of financial deregulation induced by the government of Indonesia to anticipate the negative impact of the crises to the banking market entry. The Indonesian government introduced a series of financial regulations in response to worsening conditions in the global economy. The government of Indonesia has taken both reactive and proactive measures. The government and the central bank have made joint efforts to maintain financial market stability and to provide a fiscal stimulus in order to keep domestic demand growth at its usual annual rate. So far, the Indonesian economy has managed to be the only country in the Southeast Asian region that has had positive growth.

With regard financial regulation, the number of Islamic banks have increased from five to eleven banks in 2011 and lead to a decrease in market concentration. Financial deregulation also allowed regional banks to open their Islamic business unit of their own regional banks. Just before the crisis, there was a concern of overbanking in Indonesia with 130 nationwide banks and 25 regional banks.

## 5.2 New Indicators of Competition and Market Power

In this section I propose to calculate the PR-H, which is refers the level of competition. The H-statistic is calculated for all the period studied for both markets as well as test of equilibrium.

**Table 5** Equilibrium test: Fixed Effect estimation result of Islamic and Conventional banks

	Islamic banks		Conventional banks	
	coef.	t-stat	coef.	t-stat
<b>Price of Deposit (lnw1)</b>	-0.004980	-1.563284	-0.002618	-0.760817
<b>Price of Capital (lnw2)</b>	-0.007794***	-2.726670	0.000427	0.239104
<b>Price of Labor (lnw3)</b>	-0.002547	-0.737756	-0.008525*	-1.956557
<b>Loans Ratio (lnz1)</b>	-0.001275	-1.235578	0.002785***	3.827147
<b>Total Assets (lnz2)</b>	0.003476***	3.185374	0.015665***	6.291397
<b>Capital Ratio (lnz3)</b>	0.005095***	4.375565	0.005952***	4.267478
<b>Constant</b>	-0.074050	-3.316191	-0.258371	-6.431301
<b>R<sup>2</sup></b>	0.611307		0.340922	
<b>E-statistic</b>	-0.015321		-0.010	-2.47827
<b>Wald test (F-test) for E=0</b>	7.814250 <sup>b</sup>	-0.015321	5.640613 <sup>b</sup>	
<b>Observations</b>	166		758	

Note. The table presents coefficients and t-statistics from the estimation of equation (2) for sample of conventional banks and Islamic banks fixed effects (FE) estimators. The dependent variable is  $\ln(1+ROA)$ . The *E-statistic* is computed as the summation of the coefficients of the three input prices (i.e.  $w_1 + w_2 + w_3$ ). The Wald test (*F-Stat*) along with associated p-values is applied to test the

$E = 0$  null hypotheses (long-run equilibrium), <sup>a</sup> denotes  $E$ -statistic not significantly different from zero, <sup>b</sup> denotes  $E$ -statistic significantly different from zero.

Based on Table 6 relative to the calculation of the PR-H, the statistics calculated for both samples belongs to the interval (0-1). I note that the value of the PR-H statistics of the Islamic panel is weaker than the conventional sample, respectively, equal to 10.81 percent and 84.96 percent. The Islamic market is more monopolistic. We can thus assert that both markets are in a situation of monopolistic competition, it means that an increase in input costs will lead to a less proportional increase of revenues. The annual calculation of the statistics PR-H for the analysis of the competitive conditions allows us to take into account the effect of the global financial crisis and deregulation on the structure of market. The estimation of equation (2) relative to the test of equilibrium gives the results illustrated by Table 5. I observe that all the values found for both markets are very close to zero what implies that both segments of banking market are not in long-term equilibrium. According to the interpretation of Shaffer (2004), I can neglect the hypothesis of long-term balance when the values of PR-H are positive (Table 6). Shaffer (2004) underlines that the rejection of the test of equilibrium does not distort the inferences based on the results of the estimation of this indicator. He argues that the hypothesis of the long-term equilibrium is not strictly necessary in the presence of the positive values of the statistics (the values obtained at the level of our study are quite positive during the global estimation as well as during the annual estimations). He also underlines that the no equilibrium can suggest a dynamic development of the industry.

**Table 6** Competitive structure for Islamic and Conventional banks

	Conventional Banks			
	Islamic		Conventional	
	coef.	t-stat	coef.	t-stat
<b>Price of Deposit (lnw1)</b>	-0.006638	-0.068814	0.280247***	11.59786
<b>Price of Capital (lnw2)</b>	0.159438**	2.016092	0.067897***	5.423446
<b>Price of Labor (lnw3)</b>	-0.044691	-0.444309	0.501454***	16.41338
<b>Loans Ratio (lnz1)</b>	0.259578***	8.026796	0.006130	1.201016
<b>Total Assets (lnz2)</b>	0.683388***	19.78541	1.008334***	57.67801
<b>Capital Ratio (lnz3)</b>	0.453091***	11.79748	0.061259***	6.255521
<b>Constant</b>	4.397127	6.837708	1.033529	3.916740
<b>R<sup>2</sup></b>	0.941446		0.989612	
<b>H-statistic</b>	0.108109		0.849598	
<b>Wald test (F-test) for H=0</b>	0.468219 <sup>c</sup>	0.108109	22.47988 <sup>a</sup>	-0.150402
<b>Wald test (F-test) for H=1</b>	31.86782 <sup>b</sup>	-0.891891	22.47988 <sup>b</sup>	-0.150402

The table presents coefficients and t-statistics from the estimation of equation (1) using fixed effects (FE) estimation techniques. The dependent variable is  $\ln TR$  (the logarithm of total revenues). The  $H$ -statistic is computed as the summation of the coefficients of the three input prices (i.e.  $w_1 + w_2 + w_3$ ). The Wald test ( $F$ -test) along with associated  $p$ -values is applied to test the  $H = 0$  and  $H = 1$  null hypothesis. The Hausman test along with its  $P$ -value is used to test the suitability of the fixed effects model against the random effects model. <sup>a</sup> denotes  $H = 0$  is rejected. <sup>b</sup> denotes  $H = 1$  is

rejected and <sup>c</sup> denotes  $H=1$  is not rejected. \*, \*\* and \*\*\* represent significance at 0.1, 0.05 and 0.01 levels, respectively.

The regression results of equation (3) for the Islamic and conventional banks' sample are reported in Table 6. The estimates obtained from the FE estimator of conventional banks indicate that the coefficients of input prices of deposits ( $\text{LnW}_1$ ), physical capital ( $\text{LnW}_2$ ) and labor ( $\text{LnW}_3$ ) are positive and statistically significant at 1 percent level. These results indicate that the unit prices of all input variables are important in explaining the variation of the total revenues of banks.

Although the coefficients on the bank specific factors are of secondary interest to competitive analysis, they are reported for the overall sample along with H-statistics in Table 6. Other than fixed-effects models (FE), the regression models estimated for both R-squared values are higher than 0.90 and plausible parameter estimates. The sign on the size coefficient ( $\text{LnW}_2$ ) is generally positive and significant and it suggests that size differentials in assets among banks lead to higher interest revenues for the larger banks. The positive sign on the coefficient for the loans-to-assets variable ( $\text{LnW}_1$ ) implies higher interest revenue per million rupiah of assets for banks with a higher proportion of loans on their portfolio. The risk coefficient ( $\text{LnW}_3$ ) has positive and significant effect on total revenue. It indicates that banks with high proportion of equity capital (riskier banks) are able to generate higher income per million rupiah of their assets.

In the case of Islamic banks, the estimates obtained from the FE estimator indicate that the coefficients of input prices of physical capital ( $\text{LnW}_2$ ) is positive and statistically significant at 5 percent level. Meanwhile the price of deposits ( $\text{LnW}_1$ ) and labor ( $\text{LnW}_3$ ) do not have significant impact on the bank's revenue. These results indicate that the unit price of physical capital is more important than the unit prices of deposits and labor in explaining the variation of the total revenues of banks.

All the three control variables of Islamic banks have positive coefficients and significant impact on bank revenues. This may indicate that banks with high assets can boost the confidence of their customers, thereby leading to higher revenue. The positive coefficient on total assets ( $\text{LnZ}_2$ ) also evidence for the presence of economies of scale. Furthermore, banks of large size enjoy scale economy and achieve higher revenue. The positive sign on the coefficient for the financing-to-assets variable ( $\text{LnZ}_1$ ) implies higher revenue from fund disbursement per million rupiah of assets for banks with a higher proportion of financing on their portfolio. The risk coefficient ( $\text{LnZ}_3$ ) has positive and significant effect on total revenue. It indicates that banks with high proportion of equity capital (riskier banks) are able to generate higher income per million rupiah of their assets

### 5.3 Robustness Test

Robustness tests in this study is conducted to ensure that the results obtained are not affected by alternative specifications of the main models. First, the main regression model (3) is run by using an alternative dependent variable for both the conventional and Islamic banks. Several studies that apply the PR model use total revenue divided by total asset as a dependent variable. The regression model of this study uses total revenue as a dependent variable. The ratio of total revenue to total assets is employed as dependent variable for both Islamic and the conventional banks (specification I and III) to see the sensitivity of the main results where total revenue was used as dependent variable. This robustness test also checked the main results by excluding

some bank-specific control variables. Specifically, the test have checked on the sensitivity of the main results for both the conventional and Islamic banks by excluding the ratio of loans to total assets ( $LnZ_1$ ) and the ratio of capital to total assets ( $LnZ_3$ ) from the main model (Specification II and IV). Table 7 reports the results of the alternative specification tests. Specification I and III present both type of alternative specifications for the conventional whereas specification II and IV columns for Islamic banks. The sensitivity analysis results are in agreement with the main results.

**Tabel 7** Sensitivity analysis: Estimation results from

alternative specifications (2006-2013)

	Islamic Banks				Conventional Banks			
	Spesification I		Spesification II		Spesification III		Spesification IV	
	coef.	t-stat	coef.	t-stat	coef.	t-stat	coef.	t-stat
<b>Price of Deposit (lnw1)</b>	-0.006638	-0.068814	0.726763***	5.370384	0.280247***	11.59786	0.21161***	8.616497
<b>Price of Capital (lnw2)</b>	0.159438**	2.016092	-0.165651	-1.225354	0.067897***	5.423446	0.026638**	2.029113
<b>Price of Labor (lnw3)</b>	-0.044691	-0.444309	-0.224578*	-1.945374	0.501454***	16.41338	0.63502***	21.22164
<b>Loans Ratio (lnz1)</b>	0.259578***	8.026796			0.006130	1.201016		
<b>Total Assets (lnz2)</b>	-0.31661***	-9.166544	0.326096***	7.718056	0.008334	0.476703	-0.029903*	-1.762301
<b>Capital Ratio (lnz3)</b>	0.453091***	11.79748			0.061259***	6.255521		
<b>Constant</b>	4.397127	6.837708	7.638288	8.292535	1.033529	3.916740	1.641045	6.595846
<b>R<sup>2</sup></b>	0.931276		0.809371		0.802721		0.766339	
<b>H-statistic</b>	0.108109		0.336534		0.849598		0.8770	
<b>Wald test (F-test) for H=0</b>	0.468219 <sup>c</sup>	0.108109	2.864438 <sup>a</sup>	0.336535	717.3233 <sup>a</sup>	0.849598	751.8269 <sup>a</sup>	0.873269
<b>Wald test (F-test) for H=1</b>	31.86782 <sup>b</sup>	-0.891891	11.13308 <sup>b</sup>	-0.663465	22.47988 <sup>b</sup>	-0.150402	15.83389 <sup>b</sup>	-0.126731

The Wald test (F-test) along with associated p-values is applied to test the  $H = 0$  and  $H = 1$  null hypothesis: <sup>a</sup> denotes  $H = 0$  is rejected, <sup>b</sup> denotes  $H = 1$  is rejected and <sup>c</sup> denotes  $H = 1$  is not rejected. \*, \*\* and \*\*\* represent significance at 0.1, 0.05 and 0.01 levels, respectively.



## 5.4 The Lerner Index

The Lerner index refers to the degree of market power and measures the capacity of a bank to increase its price with regard to its marginal cost. The coefficients obtained from the estimation of the function of cost presented by equation (3) allow us to calculate the marginal cost of the bank illustrated by equation (4).

**Table 8** Estimation result of the translog cost function for the sample of Conventional and Islamic banks

	Islamic		Conventional	
	coef.	coef.	t-stat	coef.
<b>Output (lnq)</b>	-1.147965**	-2.116561	1.493132***	13.95861
<b>Price of Deposits (lnw1)</b>	1.268564***	1.298109	0.187182	-4.600494
<b>Price of Capital (lnw2)</b>	-3.134190	-3.012204	-0.268454***	1.316630
<b>Price of Labor (lnw3)</b>	-0.635478***	-0.693236	0.186772	-3.366365
<b>lnq lnw1</b>	-0.268113	-4.350979	-0.000120	1.101282
<b>lnq lnw2</b>	0.209347***	3.092268	-0.000721**	-0.012529
<b>lnq lnw3</b>	0.012632***	0.247733	-0.000734	-0.153984
<b>lnw1 lnw2</b>	-0.354648	-2.623291	-0.030978***	-0.061420
<b>lnw1 lnw3</b>	-0.295918***	-3.609830	-0.031446**	-3.705862
<b>lnw2 lnw3</b>	0.219020***	1.632375	-0.037775***	-1.974315
<b>Constant</b>	9.118876	1.121511	-3.823629	-4.671506
<b>R<sup>2</sup></b>	0.906275		0.992663	

The dependent variable is  $\ln TC$  (the natural logarithm of total cost). The table presents coefficients and t-statistics from the estimation of the translog cost equation (4) for the sample of Islamic and conventional banks (54 and 754 observations) using fixed effects (FE). Both regressions include year dummies and bank-fixed effects (not reported). The reported t-statistics ( $t$ -stat) are based on robust standard errors. \*, \*\* and \*\*\* represent significance at 0.1, 0.05 and 0.01 levels, respectively.

Having estimated the function cost I calculate the marginal cost for the the sample of 106 conventional banks and 27 Islamic banks to determine the Lerner average index for all the banks of our sample for every year. The results are recapitulated in table 9.

**Table 9** Annual values of Lerner Index for Islamic and Conventional banks

Year	Islamic banks	Conventional banks
2006	0.669679	0.439427
2007	0.559371	0.478651
2008	0.678691	0.487510
2009	0.683297	0.490923
2010	0.702085	0.540919
2011	0.392499	0.520091
2012	0.722952	0.520239
2013	0.698168	0.525595
Average	0,638343	0.500419

Table 9 presents the annual averages of the Lerner index calculated for every type of bank. The average index of the Islamic market for all the period is 0.6383. The values vary between 0.3925 and 0.7230. I observe that the Islamic banks register a higher values and have more market power in affecting the prices products and services offered. This can be explained by the demand of Islamic products which is higher to the supply. Also, Islamic banks use Shariah compliant products and interest a specific segment of customers. For the conventional bank, average of Lerner index is equal to 0.5004 and annual values vary between 0.4094 and 0.5409. It appears that the conventional banking institutions have less market power than the Islamic banks. The degree of market power demonstrate a slight increase between 2006 and 2010 perhaps due to merger of several banks that reduce the quantity of bank in conventional market.

In 2006, the index for Islamic banks stands at 0.6697 to achieve 0.6981 in 2013. The advantage of market power is due to the fact that Islamic banks are using special financing methods unrecognized by conventional banks. Most of these financing methods are based on basic principles in accordance with the rules of Shariah and interest a very specific segment of customers. These services mark the specificity of Islamic bank services such as the prohibition of interest and the prohibition of all forms of speculation. The slight fluctuation in the Lerner index on the Islamic market was accompanied by a significant increase in the market power of conventional banks. The Lerner index of conventional banks has increased from 0.4394 in 2006 to 0.5256 in 2013. This may appear logical since the year 2008 was marked by the beginning of the global financial crisis that has manifested itself in loss of margins as well as losses related to non-performing loans. This has led to the merger of a number of banks to avoid the higher market risk both among domestic banks and domestic and foreign bank to be joint venture banks. I deduce from Table 9 that banking in Indonesia expresses high concentration. The monopolistic competition is the main feature of the structure of this market. This allows me to examine the variables that explain the difference in the degree of competitiveness.

## 5.5 The Factors which Affect the Degree of Competition

The estimation results on the factors which affect the degree of competition for Islamic and conventional banks are reported in Table 10 and 11.

**Table 10** Factors of degree of competitiveness for conventional banks

	PR-H Statistic		Lerner Index	
	Coefficient	t-statistic	Coefficient	t-statistic
<b>Efficiency</b>	-4.092082*	-3.493734	1.093677**	15.26532
<b>ROA</b>	6.286767*	3.012900	-0.766363***	-6.004308
<b>ROE</b>	-0.478287	-1.279543	0.606336***	26.51863
<b>Capitalisation</b>	-6.577694	-2.774409	1.142594**	7.878802
<b>Concentration</b>	-8.142137*	-3.696064	-0.472539*	-3.506796
<b>Constant</b>	7.623680	6.179620	-0.176935	-2.344671
<b>R<sup>2</sup></b>	0.979672		0.998432	
<b>F Statistic</b>	19.27720*	0.050048	254.6984***	0.003915

\*significant 10%. \*\* significant 5% and \*\*\*significant 1%

**Table 11** Factors of degree of competitiveness for Islamic banks

	PR-H Statistic		Lerner Index	
	Coefficient	t-statistic	Coefficient	t-statistic
<b>Efficiency</b>	3.125512	1.428787	-0.340568**	-8.797983
<b>ROA</b>	22.98586	1.288215	-2.571936	-8.145557
<b>ROE</b>	-2.592761	-0.571786	0.102164**	1.273219
<b>Capitalisation</b>	-2.982694	-1.441196	0.325970**	8.900717
<b>Concentration</b>	-5.80E-09	-0.182456	8.00E-09***	14.21524
<b>Constant</b>	-1.538670	-1.045569	0.383995	14.74572
<b>R<sup>2</sup></b>	0.754781		0.994544	
<b>F Statistic</b>	1.231197	0.505060	72.90827**	0.013585

\*significant 10%. \*\* significant 5% and \*\*\*significant 1%

Based on the statistic of Lerner Index which is considered as a measure of competitiveness, the coefficient of efficiency for Islamic banks shows a negative sign. On the other hand, conventional banks have positive sign for that coefficient. Due to the higher index indicating the less competitive, then this result suggests that Islamic banks which operate in more competitive environments are more efficient. This finding is in contrast with the result found by Turk-Ariss (2008), but in line with Casu and Girardone (2006), who state that banks in more competitive markets can also operate more efficiently. The coefficient of ROE for both Islamic and conventional banks are positive and significant. These findings indicate that the two types banks could reach higher returns even though they operate in more concentrated market. However, based on another coefficient of profitability, ROA, in which conventional banks have significant and negative sign, implying that these banks could be more profitable in more competitive market. Furthermore, both banks categories have similar sign in coefficient of capitalization, that is, significantly positive. It reveals that even if banks operate in less competitive markets, they could be well capitalized.

Concentration has an important role in terms of a determinant for intensity of competitiveness. The power of competition for both categories of bank has improved after the concentration was introduced as a structure variable, and it could be indicated in both cases the coefficient of determination R<sup>2</sup> increase. The concentration for Islamic banks shows a significantly positive, implying that competitiveness level goes up when the concentration decrease. This finding is in consistent with that suggested by Turk Ariss (2008) and Casu and Giradone (2006), which reveals that there is a negative relationship between concentration and competitiveness. Different result was obtained for conventional banks, that shows the concentration variable has a significant and positive sign. It confirms that conventional banks can well perform well even if the market becomes more concentrated. This finding is in contrast with the hypothesis of structure-conduct-performance (SCP) paradigm which argues that the most concentrated markets are highly likely to have more market power.

Concerning the H-statistic, no significant result exist for Islamic banks. While for conventional banks, the result demonstrates that efficiency has significantly negative effect at 10 percent level. This result concludes that the most efficient banks show have most market power. This conclusion is clarified by the assumption of bank efficiency evaluating that most efficient banks are estimated to operate in more concentrated markets. Furthermore, with regard to economic profitability (ROA), conventional banks have a positive and significant effect on market power. This implies banks facing lower costs of bankruptcy lead to lower financing costs.

Nonetheless, for another indicator of profitability, that is return on equity (ROE) of these banks affects negatively but insignificantly on market power. It could be inferred that the introduction of variable concentration in estimating H-statistic has a significantly negative effect on market competitiveness.

## 6 Conclusion

This paper investigates market structure and competitive conditions among the Islamic and conventional banking industry in Indonesia during 2006–2013. The Panzer-Rosse test has been performed successfully to test the profitability of the both type of banks. The empirical findings of our study conclude that both type of banks earn their revenues under monopolistic competition over that period. In other word, the results confirm that Islamic banks are significantly less competitive than conventional banks and they express a higher degree of market power.

In terms of bank characteristics associated with the revenue of banks, empirical results from panel data regression indicate all variables including risk preference, economies of scale and leverage have significant effects in case of Islamic market, and for conventional market variable of risk preference was insignificant.

Finally, we also find that based on the statistic of Lerner Index which is considered as a measure of competitiveness, the coefficient of efficiency for Islamic banks shows a positive effect and conventional have negative effect on competitiveness. The coefficient of profitability (ROE) for both banks demonstrate a negative impact on market power. However, according to another coefficient of profitability, ROA, there was no significant for Islamic banks, and a significant and positive effect for conventional banks. Furthermore, both banks categories have similar impact of the coefficient of capitalization, that is, significantly negative. While regarding concentration variable Islamic banks have a significantly negative effect and conventional banks have a significant positive effect on competitiveness.

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