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Analysis of the Level of Competition in Commercial Banks in Indonesia

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Abstract: Sound bank competition will give rise to banks with good performance that can compete at both the regional and global levels. The global financial crisis in 1998 influenced Indonesia's financial sector. The goals of this research are (1) to analyze the level of different banking competitions between banks according to BUKU 1, BUKU 2, BUKU 3, BUKU 4; (2) to analyze the SCP of the commercial banks in Indonesia; and (3) to formulate a recommendation for the implication of the Indonesian general banks' competition level for the financial sector policies. According to the research results, banks are classified into BUKU 1, BUKU 2, BUKU 3, and BUKU 4 based on the amount of core capital with a performance that increased respectively from BUKU 1 to BUKU 4; banks are classified based on the ownership into state-owned banks, foreign private banks, private banks, Islamic banks, and regional development banks. The research showed that the state-owned bank group exhibited the best performance and the regional development banks demonstrated the worst performance. The novelty of the research is in analyzing the level of competition between all banks in Indonesia and between the type of banks (government, private, Syariah, local) and level of capital (Buku 1, Buku2, Buku3, and Buku4).

Keywords: BUKU banks, performance, structure conduct performance.

印尼商业银行竞争水平分析

摘要：良好的银行竞争将催生具有良好业绩的银行，可以在区域和全球层面进行竞争。1998 年的全球金融危机影响了印度尼西亚的金融业。本研究的目标是（1）根据 BUKU 1、BUKU 2、BUKU 3、BUKU 4 分析银行之间不同银行竞争的水平；（2）分析印尼商业银行的 SCP；(3) 就印尼一般银行的竞争水平对金融业政策的影响制定建议。根据研究结果，银行按照核心资本的多少分为 BUKU 1、BUKU 2、BUKU 3、BUKU 4，表现分别从 BUKU 1 上升到 BUKU 4；银行根据所有权分为国有银行、外资私人银行、私人银行、伊斯兰银行和区域开发银行。研究表明，国有银行集团表现最好，区域开发银行表现最差。该研究的新颖之处在于分析印度尼西亚所有银行之间以及银行类型（政府、私人、伊斯兰、地方）和资本水平（布库 1、布库 2、布库 3 和布库 4）之间的竞争水平。

关键词: BUKU 银行、业绩、结构行为表现.

Received: August 24, 2021 / Revised: October 19, 2021 / Accepted: November 20, 2021 / Published: December 30, 2021

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1. Introduction

A dynamic financial system is important to support a good national financial system. Banking plays an important role in sustaining a stable economy and supporting real sector growth. A stable banking sector will strengthen efficiency and economic stability and improve social welfare by allocating funds and offering other financial services to economic actors, namely households and companies [14]. The traditional banking functions are to provide and extend credit, share risk, and channel deposits for productive investment. Meanwhile, the productive function of the banking sector is to promote financial stability and economic growth.

On the other hand, substandard banking creates financial instability, detrimental to the economic system. In addition, an unstable banking sector is dangerous in the banking industry itself and has a weakening effect on the economic system and other sectors. Failure in the banking sector incurs high costs for the economy. In economic turbulence, banking failures shift to other sectors through various networks.

This study used profits that deviated from the average market profit as the market attraction proxy. It was stated that the adjustment level towards the equilibrium was greater when the market experienced a very large or very small profit. The speed at which profits adjust towards the point of equilibrium is also a process towards the sector's financial stability. In addition, empirical evidence from testing will also help assess whether commercial banks earn normal profits or engage in collusion that leads to market failure. This test is also intended to assess competition between the various types of banks (BUKU 1, BUKU2, BUKU 3, and BUKU 4).

Sound bank competition correlates with economic stability; however, strong competition among banks will decrease the banks' profit [1]. The explanation is that competition among banks will decrease the credit interest rate, decreasing the debtors' probability risk of default, which ensures the stability of the economic and banking systems.

The impact of competition on profitability and bank risk-taking of 197 commercial banks in MENA (the Middle East and North Africa) countries was studied using indicators based on market structure and non-market structure [17]. It was found that it turns out that the effectiveness of deregulation reform will be able to help resolve the trade-off between competition and bank stability, and competition will have a different impact on bank profitability and risk-taking.

The banking sector concentration was analyzed to measure the level of competition in the local banking market, which has a higher concentration that significantly affects the company's cost structure [16]. Based on this research, it is found that changes in the more competitive lending sector are highly dependent on the impact on the type of bank entering the market and increasing the level of competition. Increased competition and deregulation in the banking sector, such as allowing regional commercial banks to engage in cross-regional operations, impact better economic development, where cost efficiency will be realized. Deregulation can increase efficiency in the banking sector and reduce risks and excessive competitive pressures [7]. In addition, bank performance will also be more aggressive and overinvest in risky businesses, which can cause systemic failure.

As found in [12], the government can adjust the level of competition in the banking industry through its capacity as a regulator. The function of this regulator is to determine the existence of switching costs to create and manage competition in the banking market. Their research findings are as follows: First, based on the two-sample mean test, it is found that switching costs significantly exceed conventional banks than Islamic banks, which overall costs and credit transfers. Time series data over the years show some evidence that the average switching cost for conventional banks is greater than for Islamic banks. Second, based on the traditional panel estimator, it is found that there is a positive and significant effect of switching costs on market power in a dual banking economy. Moreover, the third finding shows that Islamic banks are more influenced by switching costs than conventional banks [6].

The non-structural approach based on considerations shows that competition, particularly in the banking industry, is influenced by other factors outside of market concentration. A high level of competition can coexist with a high market concentration. On the other hand, collusive behavior can be maintained in the market employing a larger number of members. The general hypothesis-hypothesis ability (Non-Structural Model) suggested two types of contest-ability tests. First, a general equilibrium model was developed, whereas, in this model, the price of equilibrium is achieved by a company when the marginal cost equals the marginal income. The model used here was simple, and it was easy to calculate the test statistics measuring the market imperfection between the absolute market strength and perfect competition.

The general objective of the study was to see the level of competition between commercial banks in Indonesia. The general objective was achieved through the specific objectives below:

- Analyzing the different levels of banking competition between Bank BUKU 1, BUKU 2, BUKU 3, BUKU 4;
- Analyzing the structure, conduct, and performance of the general banks in Indonesia;
- Formulating recommendations for the implications of the level of competition commercial banks in Indonesia for policies in the financial sector.

2. Analysis Methods

The secondary data was collected from the Financial Services Authority (OJK). The banking data collected was quarterly data from the first quarter of 2002 to the fourth quarter of 2014. The use of data from 2002 to 2014 was because, in this period, banking data, especially those related to banking classification in BUKU 1 to BUKU 4, were relatively stable, so they did not make banking movements between Books issues.

The data collected were processed using the data envelopment analysis (DEA) model and the panel model. DEA was used to determine the efficiency of each bank or decision-making unit (DMU), whose value was then used in the panel model. The DEA value was then calculated for each quarter for all banks in Indonesia.

The DEA model used inputs and outputs. In the present study, three inputs and two outputs were used. The inputs used were administrative, general, personnel, and interest costs. Whereas the outputs used were the amount of credit and savings. The DEA analysis was processed using Ma DEA for each quarter for all the banks in Indonesia.

The second model was the Indonesian banking performance model. This model was used to prove the structure conduct performance (SCP) theory. The model estimated was:

$$ROA_{it} = \alpha_0 + \alpha_1 CR_t + \alpha_2 MS_{it} + \alpha_3 EFF_{it}$$

where:
ROA: bank i's ratio between profit and asset during the t-*th* quarter;
CR: the concentration ratio during the t-*th* quarter;
MS: bank i's market share during the t-*th* quarter;
EFF: bank i's technical efficiency value during the t-*th* quarter t.

The indicators CR4 and HHI were used for the concentration ratio calculation. CR4 measured the four banks with the largest market share in each quarter, whereas the technical efficiency indicator used two indicators: DEA efficiency value and dummy efficiency. Dummy efficiency equals 1 when the DEA efficiency value is 1, while when it is less than one, it is valued as zero.

Two models will be estimated in the panel data, the fixed-effect model (FEM) and the random effect model (REM). The method used to choose whether the panel data should be estimated through the fixed effect model (FEM) approach or the random effects model (REM) approach was by testing the assumption whether there was a correlation between the regressor and the individual effect. The Hausman test was used in testing this assumption. The testing hypothesis was formulated as follows [4]:

H_0: $E(\tau_i x_{it}) = 0$ or REM is the suitable model
H_1: $E(\tau_i x_{it}) \neq 0$ or FEM is the suitable model.

The Hausman statistic was used as the basis for rejecting H_0, and it was compared to Chi-square. The Hausman statistic was formulated as:

$$H = (\beta_{REM} - \beta_{FEM})' \, (M_{FEM} - M_{REM})^{-1} (\beta_{REM} - \beta_{FEM}) \sim X^2 (k)$$

where: M is the covariance matrix for parameter β;
k is the degree of freedom.

If the test-result H value was greater than the table X^2, this was enough evidence to reject H_0, so the model used was FEM, and *vice versa*. The conclusion was also made based on the Correlated Random Effect-Hausman Test in STATA application output. If the probability value obtained was less than the 5% real level, this was enough evidence to reject H_0 so the model used was FEM and *vice versa*.

3. Results

The first objective in the current study was to analyze bank competition among BUKU 1, BUKU 2, BUKU 3, and BUKU 4. The competition was observed from the market share of each BUKU from 2002 to 2014. The market share was calculated based on the asset compared to the total asset of the banking industry in that particular year.

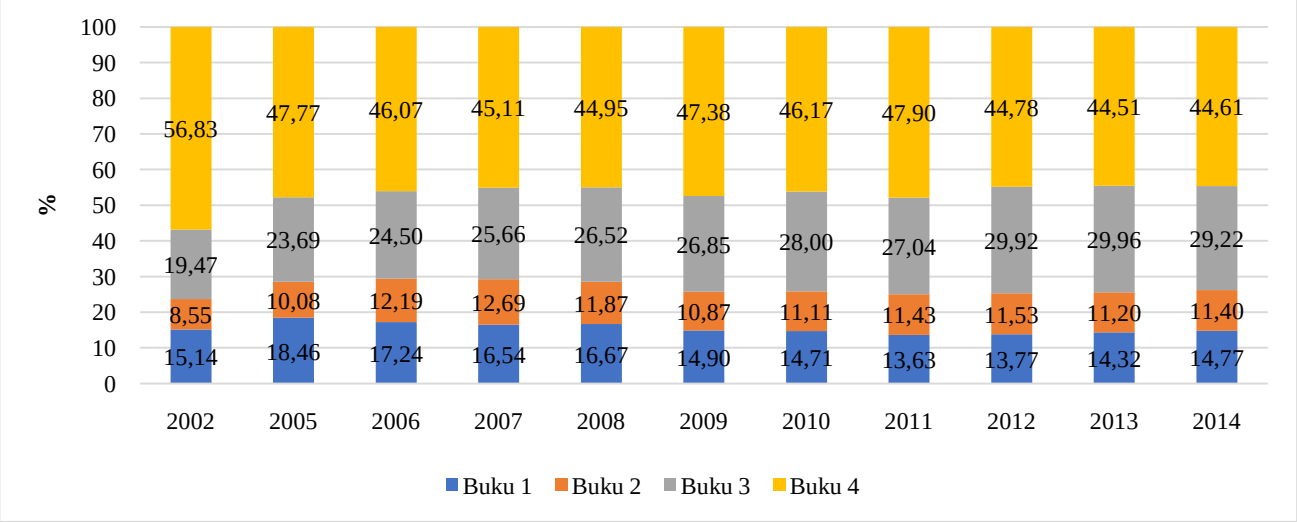

Fig. 1 The bank market share based on BUKU 1, BUKU 2, BUKU 3, and BUKU 4

Figure 1 shows that the market share of BUKU 4 decreased 12.21 percent in the 2002 to 2014 period. The banks in BUKU 4 experienced decreased competitiveness compared to the other banks. One of the reasons was the increased market share of the banks in BUKU 3, where there was a 9.75 percent increase in the share and a 2.85 percent increase in the market share in the bank in BUKU 2. On the other hand, the smaller banks categorized as the BUKU 1 bank category experienced a 0.37 percent decrease in market share in 2014 compared to 2002. This result shows that the banks in BUKU 2 and BUKU 3 increased in competitiveness, thus could defeat the banks in the BUKU 1 category

The increased competitiveness in the BUKU 2 and BUKU 3 banks was also caused by greater assets in the two categories. Banks in BUKU 2 experienced a 580 percent increase in assets, and those in BUKU 3 experienced a 665 percent increase in 2014 compared to 2002. Meanwhile, the banks in BUKU 1 and BUKU 4 also experienced an increase, but their increase was less than that in BUKU 2 and BUKU 3. The banks in BUKU 1 experienced a 397 percent increase in assets, and those in BUKU 4 had a 300 percent increase in 2014 compared to the 2002 period.

The technical efficiency was calculated using the Data Envelopment Analysis (DEA) method in the first phase (Figure 2). The efficiency value could be classified based on the BUKU 1 to 4 categories and bank ownership. In the bank categories based on BUKU 1, BUKU 2, BUKU 3, and BUKU 4, it can be seen that the banks in the BUKU 4 category were the most efficient. The efficiency value was always equal to 1 except in 2012 where it was 0.99. This showed that the banks in BUKU 4 were the reference for other banks in the banking industry in Indonesia. This result was similar to [5], demonstrating that banks in BUKU 4 had the highest efficiency among all the other banks. As demonstrated in [9], the efficiency value in banks in BUKU 4 was positively influenced by the exchange rate, Loan to Deposit Ratio (LDR), deposit share, and Return on Asset (ROA).

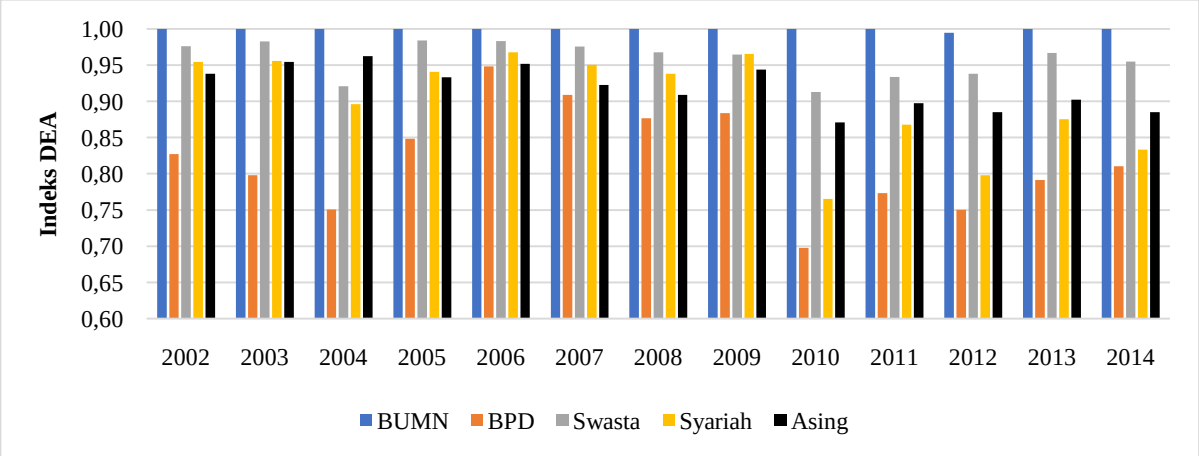

Fig. 2 The average technical efficiency value of the five bank groups based on ownership, 2002-2014

Meanwhile, the Capital Adequacy Ratio (CAR), inflation, and total asset variables negatively influenced efficiency. Banks in BUKU 3 were ranked second in terms of efficiency, with an average efficiency value of 0.98 in the 2002 to 2014 period. Meanwhile, banks in BUKU 1 and BUKU 2 had relatively similar efficiency values, 0.91

The step to be taken in the second phase was estimating the similarities in the panel data panel to observe any relationships between the market concentration, market share, and efficiency. The CR4 value or the Herfindahl-Hirschman Index (HHI) is used to assess the concentration level of a certain industry. The CR4 value showed that the market share of the four largest banks, while HHI was calculated from the total squared market share of all the banks every quarter. An HHI value of < 1500, showing that the industry had a relatively perfect competition was categorized in [3]. The HHI value of the Indonesian banking industry showed that the industry is in the perfect competition category.

Figures 3 and 4 show the CR4 and HHI values for the first quarter of 2002 to the fourth quarter of 2014. In the third quarter of 2002, the CR4 and HHI values reached a peak at 59.84 for the CR4, which means that the four largest banks in Indonesia controlled 59.84 percent of the Indonesian market.

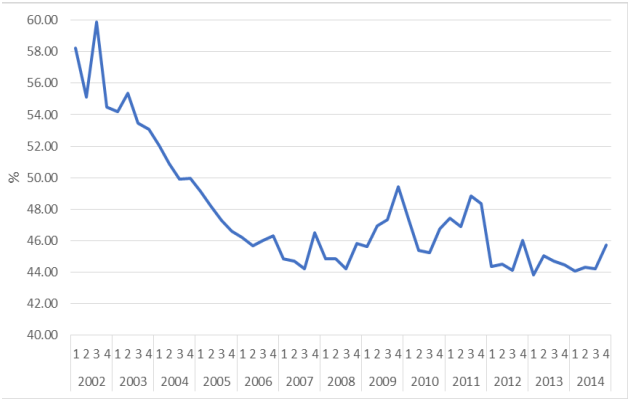

Fig. 3 The CR4 value of the Indonesian banking industry, 2002-2014

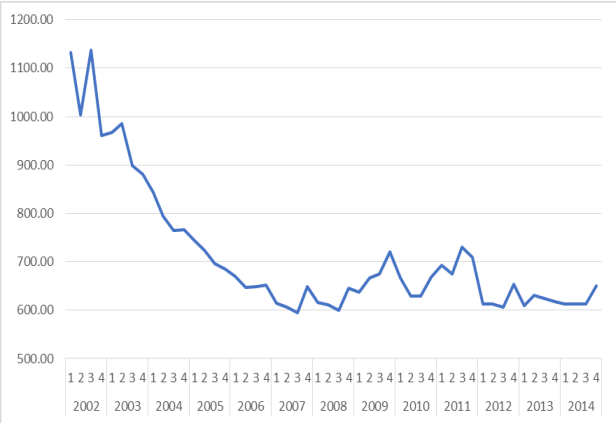

Fig. 4 The HHI value of the Indonesian banking industry, 2002-2014

Meanwhile, from 2003 to 2007, the CR4 and HHI values experienced a significant decline and reached the lowest point at a CR4 value of 44.24 percent in the third quarter of 2007. This showed that the level of competition in Indonesian banking had increased, and its market structure leaned toward a perfect competition market. The four largest banks with the largest market share consisted of three state-owned banks (Mandiri, BNI, and BRI) and one private bank (BCA), which consistently dominate each period.

The calculation of the factors that influence the performance of the banks in Indonesia is given in Table 1. The bank performance was calculated using the value of the ROA (*return on assets*) with structure, conduct, and efficiency functions. The structure was calculated using two variables, CR4 and HHI, conduct used to share, while efficiency used the DEA (Data Envelopment Analysis) score. DEA was used to assess the efficiency of each bank during each quarter. The efficiency is used as the ratio between the output and input value. The output used was the total credits and total deposits, while the input used was the operational burden, workforce burden, and interest burden. The DEA efficiency value was between 0 and 1, where a value of 1 was efficient.

The data used was quarterly data from the first quarter of 2002 to the fourth quarter of 2014, and the number of banks analyzed was 146. The data was processed using the panel data approach with 146 banks as the cross-section and the analysis period as the time series variable.

The results showed that the banking performance in Indonesia was determined more by external factors than internal factors (Table 1). This could be seen in the fact that the concentration variables, CR4 and HHI, influenced the bank performance in Indonesia [2]. The coefficient for the two variables was positive, meaning that the more concentrated the banking industry is, the higher the level of profitability of the banks in Indonesia will become. On the other hand, internal factors, namely market share and efficiency, did not affect the level of profitability.

Table 1 The estimation of all the bank results

Variable	**Model 1**			**Model 2**		
	Coefficient		**p-value**	**Coefficient**		**p-value**
Constant	-64.26	*	0.06	-17.10		0.42
Market share	-0.96		0.85	-0.97		0.85
CR4	1.65	***	0.01			
HHI				0.04	**	0.01
DEA Score	-6.72		0.71	-7.10		0.70
F test	2.37	*	0.07	2.14	*	0.09
R^2	0.00					
N	6113			6113		
Model	Fixed			Fixed		

Notes:
*** Significant at the 1% level of significance
** Significant at the 5% level of significance
* Significant at the 10% level of significance

The CR4 coefficient value was 1.65, which meant that for every one percent increase in CR4, ROA would increase 1.65, *ceteris paribus*. This increase indicated that the market structure of Indonesian banking influenced the level of profitability of banks in Indonesia; the lower the level of competition (shown by an increase in CR4 or HHI), the higher the level of profitability in Indonesian banking. This observation supports the Structure Conduct Performance (SCP) theory that states that the higher the market concentration, the greater the profit resulting from this collusive behavior.

Table 2 presents an estimation of the equation based on the BUKU category. In BUKU 4, it can be seen that the market concentration variable, both using the CR4 indicator and the HHI indicator, had a negative value and differed in the estimation for all the banks in Table 1. The CR4 coefficient was -0.06, which means that a 1 percent increase in CR4 would decrease ROA by 0.06. There were four banks in BUKU 4, and these banks were the four banks with the largest market share, making them a CR4 component. A different result was demonstrated for banks BUKU 1, 2, and 3, which showed that increased market concentration would increase ROA, albeit with different magnitudes. An increase in CR4 by 1 percent would increase ROA by 1.61 in BUKU 1, by 2.09 in BUKU 2, and by 0.05 in BUKU 3. This means that an increased market share in the four largest banks (CR4) which are also part of the banks BUKU 4, would instead increase the ROA of the banks in BUKU 1, 2, and 3 while decreasing the ROA in BUKU 4.

Table 2 Estimation of the results of the banks in BUKU 1, BUKU 2, BUKU 3, and BUKU 4

Variable	BUKU 1				BUKU 2				BUKU 3				BUKU 4			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
Constant	-43.65	0.34	1.53	0.95	-59.61	0.38	3.02	0.94	1.11	0.64	2.74	0.18	13.01	0.20	11.81	0.25
Market share	0.10	0.99	0.09	0.99	7.44	0.64	7.19	0.65	-0.16	0.49	-0.18	0.44	-0.02	0.52	-0.02	0.45
CR4	1.61 *	0.07			2.09 *	0.10			0.05 *	0.06			-0.06 ***			
HHI			0.04 *	0.07			0.05	0.14			0.00 *	0.09			-0.00 ***	0.00
DEA Score	- 29.90	0.15	- 29.98	0.15	- 33.02	0.26	- 33.96	0.25	- 0.68	0.72	- 0.71	0.71	-6.73	0.51	-7.27	0.48
F test	5.06	0.17	4.93	0.18	4.22	0.24	3.66	0.30	1.79	0.15	1.54	0.20	6.25 ***		5.75 ***	0.00
R^2	0.00		0.00		0.00		0.00		0.02		0.02		0.06		0.06	
N	3301		3301		1799		1799		805		805		208		208	
Model	Random		Random		Random		Random		Fixed		Fixed		Fixed		Fixed	

Notes:
*** Significant at the 1% level of significance
** Significant at the 5% level of significance
* Significant at the 10% level of significance

Tables 3 and 4 present the estimation for the grouping based on ownership. The significant variable in the state-owned bank group was market concentration, both using CR4 and HHI, but with opposite signs (Table 1). The CR4 variable coefficient was negative, meaning that an increase in CR4 would decrease ROA. This was similar to the behavior in the banks in BUKU 4 because the banks in BUKU 4 were three state-owned banks plus one private bank. Meanwhile, the HHI value was positive and significant but very small.

Table 3 Estimation of the state-owned, private, and foreign banks

Variable	State-owned				Private				Foreign			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
Constant	12.79	0.16	11.90	0.19	23.79	0.28	9.07	0.55	-3.93 **	0.01	-0.96 **	0.39
Market share	-0.03	0.21	-0.03	0.22	0.18	0.86	0.18	0.86	0.78 **	0.01	0.77 **	0.02
CR4	-0.04 ***	0.01			-0.52	0.17			0.10 ***	0.00		
HHI			0.00 ***	0.01			-0.01	0.18			0.00 ***	0.00
DEA Score	-7.75	0.39	-7.98	0.38	2.58	0.85	2.78	0.84	1.37 **	0.02	1.42 **	0.01
F-test	4.91 ***	0.00	4.90 ***	0.00	1.95	0.58	1.85	0.60	33.92 ***	0.00	28.95 ***	0.00
R^2	0.01		0.01		0.00		0.00		0.12		0.12	
N	208		208		3751		3751		534		534	
Model	Fixed		Fixed		Random		Random		Random		Random	

Notes:
*** Significant at the 1% level of significance
** Significant at the 5% level of significance
* Significant at the 10% level of significance

All the variables were significant in the foreign bank group and had a positive value (Table 3). An increase in market concentration, share, and efficiency would increase the ROA. The market share and efficiency variables were only significant in the foreign bank category. This means that in the case of foreign banks, increasing the ROA did not only depend on an external factor (market concentration) but was also determined by internal factors, the bank's market share, and efficiency rate.

Table 4 Estimation of the Regional Development Bank and Islamic Bank Results

Variable	Regional Development Bank				Islamic			
	Model 1		Model 2		Model 1		Model 2	
	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
Constant	-421.38 ***	0.00	-149.30 **	0.04	-6.21	0.97	-11.75	0.92
Market share	5.88	0.91	4.42	0.93	1.76	0.99	1.57	0.98
CR4	9.66 ***	0.00			-0.19	0.93		

Continuation of Table 4										
HHI				0.27	***	0.00			-0.00	0.94
DEA Score	-14.10		0.78	-15.86		0.76	18.32	0.87	18.37	0.87
F test	13.90	***	0.00	12.89	***	0.00	0.03	0.99	0.03	0.99
R^2	0.01			0.01			0.00		0.00	
N	1355			1355			265		265	
Model	Random			Random			Random		Random	

Notes:
*** Significant at the 1% level of significance
** Significant at the 5% level of significance
* Significant at the 10% level of significance

In the Regional Development Bank group, the CR4 coefficient value was the highest among all the categories (Table 4). A 1 percent increase in the CR4 would increase the ROA by 9.66 and HHI by 0.27. This increase showed that collusive behavior would increase the performance of Regional Development Banks [10]. This was similar to [15], which demonstrated that market concentration was significant and positive. The authors used the HHI indicator with a coefficient value of 0.006, which was yang lower than the results of this study which was 0.27. It was also demonstrated in [13] that Regional Development Banks had market power though the values varied.

In the private and Islamic bank groups, one variable was significant, indicating that the SCP theory did not apply to these two categories, and there was another variable that influenced the ROA variable in private and Islamic banks. This finding was similar to the study results of [8], [11], demonstrating that market share and efficiency did not affect the ROA in the case of Islamic banks.

4. Conclusion

The competition in the industry and efficiency in the Indonesian banking sector was analyzed using various empirical assessments, which gave a comprehensive overview of the development of the Indonesian banking sector. The determining factors of the competition in the Indonesian banking sector were estimated with a specific focus on the effects of the banking reform are as follows:

1. Banks based on BUKU 1, BUKU 2, BUKU 3, and BUKU 4, categorized based on core capital, had a performance that increased from BUKU 1 to BUKU 4. The efficiency level booked by the banks in bank BUKU 4 was the highest, while that of the banks in BUKU 1 was the lowest. During the analysis period, the banks in BUKU 2 and 3 exhibited changes in performance and increased competitiveness.
2. The effect of the market concentration (CR4) on the banks in BUKU 4 had a negative and significant value. This contradicted the *Structure Conduct Performance* theory, which stated that market concentration would increase banking performance, while the other categories were positive.
3. The Indonesian banking industry's HHI value which measures the concentration rate of the banking industry, showed that the banking industry in Indonesia was in the perfect competition category, meaning that the banking industry has shown a healthy market structure for the banking actors.

Ownership-based categorization was classified as state-owned banks, foreign private banks, private banks, Islamic banks, and Regional Development Banks (BPD). The research revealed that the state-owned bank group had the best performance, while the Regional Development Bank group was the worst.

Funding

The Research Project was partially or fully sponsored by Deputy for Strengthening Research and Development, Ministry of Research and Technology - Research and Innovation Agency, the Republic of Indonesia with grant number 3/E1/KP.PTNBH/2019 dated March 18, 2020 and number 1/AMD/E1.KP.PTNBH/2020 dated May 11, 2020.

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