

# Analysis of Indonesia's Commercial Bank Industry Performance in the Era of Digital Banking 4.0 (Panzar- Rosse Model Approach)

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# Analysis of Indonesia's Commercial Bank Industry Performance in the Era of Digital Banking 4.0 (Panzar-Rosse Model Approach)

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## ABSTRACT

Technological advances in the banking industry have disrupted all industries, including the banking industry. This has brought commercial banks in Indonesia towards the digital era 4.0, which has led to a shift in people's behavior in transactions and has led to many digital financial institutions. It is feared that these changes will have an impact on the performance of commercial banks in Indonesia and change the level of competition between commercial banks in the era of digital banking 4.0. This study aims to analyze the performance of the Indonesian commercial bank industry in the era of digital banking 4.0. The approach used to measure the level of influence of independent variables on the performance and level of competition of commercial banks in this study is the Panzar-Rosse non-structural approach using secondary data from commercial banks in Indonesia in the period January 2013-March 2020. The object of this study is all commercial banks conventional. Estimation of the equation uses return on asset (ROA) as the dependent variable for commercial bank performance, and variable loan to deposit (LDR), volume of e-money transactions, number of electronic data capture (EDC) machines, number of branch offices, number of automated teller machine (ATM) machines, operating expenses operating income (BOPO) and net interest margin (NIM) as independent variables. The results showed that the performance of the Indonesian commercial bank industry in the digital banking era 4.0 as measured by ROA was significant effect by the number of EDC machines, number of branch offices, number of ATM machines, BOPO and

NIM. However, LDR and volume of e-money transactions do not have a significant effect on ROA. Furthermore, based on the Panzar-Rosse model using H-statistics, it shows that the competition that occurred in commercial banks in Indonesia in the era of digital banking 4.0 was included in a monopolistic market structure.

**Keywords:** Loan to Deposit (LDR), Volume of E-Money Transactions, Number of Electronic Data Capture (EDC) Machines, Number of Branch Offices, Number of Automated Teller Machine (ATM) Machines, Operating Expenses Operating Income (BOPO), Net Interest Margin (NIM), Return on Asset (ROA)

## INTRODUCTION

The Industrial Revolution 4.0 has had a huge impact on the Indonesian banking sector. This is because banking is one of the industrial sectors that is very sensitive to any changes that occur in all aspects, both internal and external. The impact that occurs can be assessed on the results of the banking industry's performance that has been achieved.

Banks based on Law Number 10 of 1998 Article 1 paragraph 2 are business entities that collect funds from the public in the form of savings and distribute them to the public in the form of credit and or other forms in order to improve the standard of living of the people at large. Meanwhile, banking is everything concerning a bank, including institutions, business activities, and the process method for carrying out its business activities.

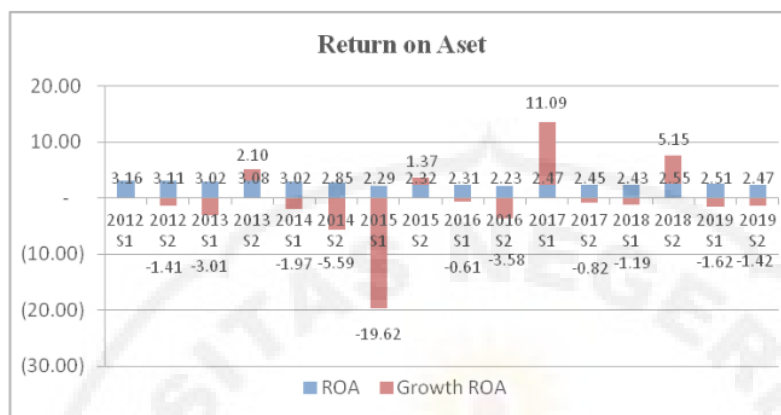


Figure 1. Developments in the Number of Branch Offices of Indonesian Commercial Banks  
Source: Indonesian Banking Statistics (OJK), Processed Data

According to Manurung and rawaty (2016), the profit generated by the banking industry is one of the indicators used to determine bank performance. An overview of the performance of commercial banks in Indonesia can be seen in the projected level of profitability through return on assets (ROA). Return on assets (ROA) is a financial ratio that shows the returns on the use of company assets. The higher the ROA, the better the bank's productivity (Kasmir, 2016).

In the initial phase of the industrial revolution 4.0, the ROA value decreased. This decline can be assessed in the first semester of 2012 ROA is at a value of 3.16. Then there is a downward trend in the following semesters. A significant decrease occurred in the first semester of 2015, reaching the position of 2.29 or 19.62% from the previous semester.

After adaptive action from both the government and banking management, in the second semester of 2015 the ROA value was corrected to 2.32 and showed a significant improvement trend in the first semester of 2017 at 2.47 or grew 11% from the previous semester. The changes in the performance of Indonesian banking above cannot be separated from the influence of external factors abroad and internal in the country which are part of the process of the industrial revolution 4.0 that occurred globally.

Table 1. Data on Health Indicators for Commercial Banks of Indonesia

Tahun	ROA	NPL	NIM	CAR
2013	3.08	1.70	4.89	18.13
2014	2.85	2.16	4.23	19.57
2015	2.32	2.49	5.39	21.39
2016	2.23	2.93	5.63	22.93
2017	2.45	2.59	5.32	23.18
2018	2.55	2.37	5.14	22.97

Source: Indonesian Banking Statistics (OJK), Processed Data

According to these data, there are several domestic factors that cause the profitability ratio (ROA) of Indonesian commercial banks to experience growth difficulties. The first factor is the potential for decline in credit quality which is projected through an increase in the value of the non-performing loan (NPL). As a financial intermediary institution, loans are one of the important production input factors in the banking industry. The quality of credit extended greatly affects performance especially for banking income. The increase in NPL was due to the sluggish domestic economy which had not recovered equally. The NPL ratio continued to experience an increasing trend seen from 2013 to 2016 the NPL became 2.93%. In 2018 the NPL recovered slightly, which fell to 2.37%.

The second factor is the downward trend in bank interest rates. Bank interest rates fell as a result of Bank Indonesia's monetary regulation to control inflation, resulting in lower bank interest margins. This can be seen from the decreasing trend

<sup>2</sup> of net interest margin (NIM). NIM is a ratio used to measure the ability of bank management to manage productive assets in the form of lending to generate interest income. This is because bank operating income is highly dependent on the difference in interest (spread) from loans (Syarif, 2006).

In 2013 the NIM value was 4.89%, decreasing in 2014 to 4.23%. In the following years, the NIM value increased, namely in 2018 the NIM became 5.14%.

The third factor is the additional regulatory burden by Bank Indonesia (2013) through the revision of Bank Indonesia Regulation Number 15/12/PBI/2013 concerning the minimum capital adequacy requirement for commercial banks, which was implemented on January 1, 2014. The

revised regulation aims to increase banking capital reserves, which is projected through the Capital on Asset (CAR) ratio data in order to mitigate risks from global financial markets, which could reduce bank health. In 2013, the number of CAR for Indonesian Commercial Banks was at 18.13% and continued to increase until 2018 to 22.97%.

"We need banking but we don't need banks anymore". The statement explains that customers need banking transactions but do not want to be bound by time and place. This is a hard code for banks, especially in Indonesia, to streamline branch office outlets and innovate more in online transactions. The emergence of Digital Banking 4.0 has reduced the role of bank branch office outlets, this can be seen in Figure 2.

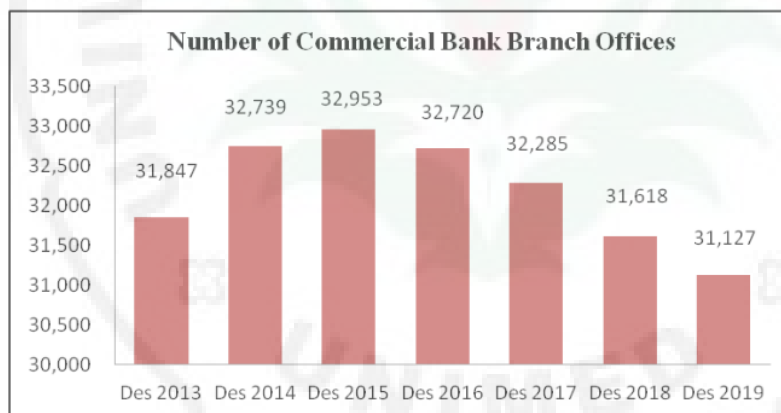


Figure 2. Developments in the Number of Indonesian Commercial Bank Branch Offices  
Source: Indonesian Banking Statistics (OJK), Processed Data

Based on OJK data in 2013, Commercial Banks have 31,847 branch offices. There was an increasing trend until 2015 the branch offices continued to experience growth to become 32,963 branch offices. In 2016, there was a downward trend that occurred until December 2019, the number of remaining branch offices was 31,127 branches or a decrease of 720 offices, when compared to December 2013.

Decreasing the Number of Branch Offices is one of the banking strategies taken to improve banking performance in carrying out efficiency. This is in

accordance with Hijrianto (2016) research which shows <sup>26</sup> the number of branch office outlets has a significant negative effect on ROA. In line with the <sup>33</sup> research of Prasetyo and Sunaryo (2015), it shows that the addition of the number of branches has a negative and insignificant effect on the performance of the banking industry.

Banking technology must be able to innovate in financial products and information technology to be able to keep up with business developments and competition by taking advantage of opportunities to serve customers through



Digital Banking 4.0. Most banking institutions invest in Information Technology to improve financial services on digital channels to keep up with global competition (Kahveci and Wolfs, 2018).

Digital Banking has a very broad scope. Digital Banking users can access all banking services through e-banking collection in one place (digital branch) and/or through one type of e-banking on the bank's/customer's device (omni channel). E-Banking is a banking service that allows customers to obtain information, communicate and transact through electronic media such as ATMs, phone banking, sms banking, electronic fund transfers, internet banking, and mobile banking, in a multi-channel manner (Peraturan Bank Indonesia No. 9/15/PBI/2007).

The era of digital banking 4.0 has changed customer behavior by using digital technology in transactions rather than making transactions at Bank outlet offices. Due to the convenience, speed and time efficiency, customers prefer Digital Banking 4.0 services. In Digital Banking 4.0 service, people are given the convenience of choosing to transact using electronic

channel (E-Chanel) including card-based payment instrument (APMK), sms banking, mobile banking, internet banking and e-banking to facilitate customer needs such as money transfers, bill payments or even opening an account.

Card-based payment instruments, hereafter referred to as APMK according to Bank Indonesia Regulation Number 11/11/PBI/2009 as amended by Bank Indonesia Regulation Number 14/2/PBI/2012 are payment instruments in the form of credit cards, automated teller machine (ATM) cards and/or debit card. APMK is a banking service facility which is the first step in the world of digital banking. In using card-based payment instruments (AMPK), Indonesian banks have prepared the supporting infrastructure so that online transactions can run well, including ATM machines, EDC machines and shops (merchants) that are willing to use APMK. The use of APMK in Indonesia is growing rapidly, this is indicated by the increase in the volume of APMK transactions in Indonesia which grew every year from 2013 to 2019 according to the graph data in Figure 3.

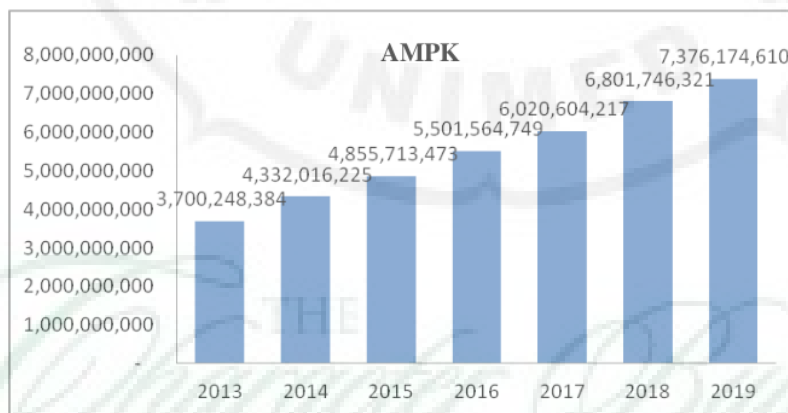


Figure 3. Development of AMPK Transactions  
Source: Payment System Statistics (Bank Indonesia), Processed Data

In 2013, the total volume of APMK transactions was 3,700,248,384 transactions. The total volume of APMK transactions continued to experience an increasing trend,

from 2014 to 2017. Significant growth occurred in 2018, namely the volume of APMK transactions grew to 6,801,746,321 transactions.

In 2019, the volume of APMK transactions experienced a growth even though it was only 8.45%, namely to 7,376,174,610 transactions. The slowdown in the growth rate of the total CBPI transaction volume is the beginning of the effect of corruption that occurred in adjustments to the development of Digital Banking 4.0. This adjustment is expected to improve banking performance.

With the emergence of APMK added many distribution channels for banking services to customers. By providing many efficient distribution channels, it is hoped that it will make it easier for people to get banking services so as to encourage profitability for banking performance. In accordance with the research of Yulianto et al. (2016) The number of ATM machines has a significant positive effect on performance. However, Diba (2017) states that the number of ATMs and foreign exchange status has a positive but insignificant effect on ROA.

The development of the Digital Banking 4.0 channel has also contributed to the emergence of startup companies engaged in the digital financial sector. One of these digital financial products is electronic money (e-money). With the emergence of Electronic Money, it will allow people to make cashless financial transactions (Tazkiyyaturrohmah, 2018).

E-money is defined as a stored-value product or prepaid card where a certain amount of monetary value can be obtained by exchanging or depositing an amount of cash or by debiting a bank account that is owned to then become an electronic value according to the balance that will be stored in an electronic device that is owned by consumers. With this equipment, the owner can make payment transactions or receive payments, where the monetary value will decrease at the time of making a payment or increase if he receives payment or can be top-up (Bank for International Settlements 1996; Tazkiyyaturrohmah 2018).

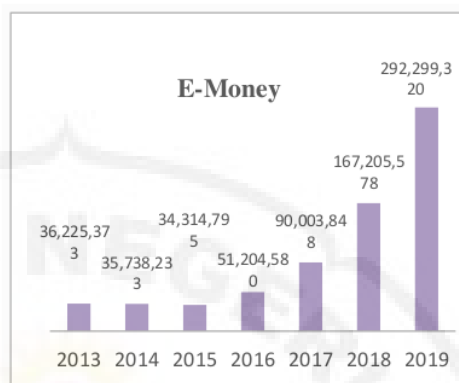


Figure 4. Growth of Electronic Money in Indonesia

Source: Payment System Statistics (Bank Indonesia), Processed Data

The development of e-money in Indonesia is growing rapidly. This can be seen from the graph in Figure 4 which illustrates the increase in the amount of E-Money in Indonesia. In 2013, the number of electronic money in Indonesia was 36,225,373. There was a downward trend that was not too significant until 2015 at the amount of e-money 34,314,795. This is due to the fact that 60% of e-money is only issued by telecommunication operators whose user level of e-money is decreasing.

In 2016, the amount of e-money experienced a significant growth improvement of 49.22% with a total amount of 51,204,580. This increasing trend occurred until 2019 with the number of e-money growing by 49.80% compared to December 2018 with a total of 250,477,938.

The growth of e-money is due to regulations from the government as Bank Indonesia has issued a Bank Indonesia Regulation, 20/6/PBI/2018 dated 03 May 2018, which provides security guarantees to the public for e-money users as payment for digital banking 4.0. With this, the public's preference for the use of e-money continues to strengthen and grow and is supported by the integration of e-money in the expanding financial ecosystem of digital banking 4.0.

Digital banking 4.0 changes people's behavior in banking transactions. People today do more banking transactions online than offline transactions. Market behavior is

the behavior of companies in the market. This behavior can be seen from the pricing strategy and competitive strategy used. Changes in community behavior also have an impact on changes in the behavior of commercial banks that carry out many efficiency strategies by reducing the number of branch office outlets and innovating more in the field of information technology and innovation in Digital Banking 4.0 products to maintain performance growth according to (Yudaruddin, 2012)

Paradigm structure-conduct-performance (SCP) can describe the performance results of Commercial Banks in the digital banking era 4.0 in Indonesia which are influenced by changes in the behavior of these commercial banks. One of the causes of changes in the behavior of Indonesian Commercial Banks is the efficiency and innovation strategies in information technology adopted in the digital banking era 4.0. This efficiency and innovation strategy changed the development of input factors in achieving profitability as a proxy for Indonesian banking performance.

In the SCP structural approach, there is an interrelated relationship between the three variables one and the other. The simplest relationship of the three variables is a linear relationship where structure affects behavior then behavior affects performance (Tanjung and Ruslan, 2019).

According to Vesala (1995), the non-structural approach explains that it is performance that affects the company's decision to enter the industrial market, so it also affects the industrial market structure. The non-structural approach to analyzing the level of competition does not look at the market structure because to find out the pattern of competition is not only enough to use market structure information, but requires additional information. In the S-C-P structural approach it is assumed that a one-way linear relationship between structure, behavior and performance is assumed, but in a non-structural approach, market structure and company behavior are

endogenous because there is feedback from behavior to market structure.

In the non-structural approach introduced by Panzar and Rose in 1987, it explains the relationship between changes in input factor prices and the income earned by the company. In the panzar-rosse model, it is very relevant to explain the situation in the banking industry. Where changes in input factors are also a strategy taken by companies to improve performance (Yudaruddin, 2012).

Here are some of the advantages of the panzar-rosse equation model (Shaffer, 2004):

1. Can be calculated using a simple equation (single equation) that is using a linear regression model.
2. Estimating only requires a few dependent variables.
3. The panzar-rosse model is able to see a broader range of market types and structures.
4. Using the logarithmic function in the equation to show the elasticity of the variable under long-run equilibrium conditions.

The panzar-rosse model uses several independent variables for the price of the input factor to obtain the H-statistic value in determining the competitive market formed in an industry, while the other independent variables used in the panzar-rosse equation are control variables. The concept of H-statistic to show statistical indicators that can be used to determine the type of market structure of an industry. H-statistics range from negative to unit value.

The panzar-rosse equation explains that there is a relationship between changes in factor input prices and the income obtained in the balance (equilibrium) condition of the bank company. If the value of the input factor cannot be observed directly, then the unit value approach can be substituted for the proxy value that is directly related to the input factor. The assumptions used are that banks operate in their long-run equilibrium and that the performance of banks is influenced by other



actions of market participants (Yudaruiddin, 2012).

The panzar-rosse approach can be used to explain the relationship between changes in input factors that occur in the performance of commercial banks in Indonesia. Changes in input factors in the digital banking era are a proxy for changes in the behavior of customers and commercial banks in facing changes in the level of competition in the market structure of the banking industry in Indonesia. These changes were made to achieve the best performance in the digital banking era 4.0.

### RESEARCH METHODS

The approach used to measure the level of influence of independent variables on the performance and level of competition of commercial banks in this study is the panzar-rosse non-structural approach using secondary data from commercial banks in Indonesia in the period January 2013-March 2020.

The object of this study is all commercial banks conventional. Estimation of the equation uses return on asset (ROA)

as the dependent variable for commercial bank performance, and variable loan to deposit (LDR), volume of e-money transactions, number of electronic data capture (EDC) machines, number of branch offices, number of automated teller machine (ATM) machines, operating expenses operating income (BOPO) and net interest margin (NIM) as independent variables.

The analysis model used in this study is the panzar-rosse model to see the effect of behavior based on input factors on the performance of Indonesian banking in the era of digital banking 4.0. Where the Panzar-Rosse model explains that the company's total revenue is influenced by input factors, which can be replaced by a proxy value that is directly related to these input factors.

The method used in this research is the ordinary least square (OLS) method in multiple linear regression analysis using the Eviews software version 10. This method is used in the panzar-rosse model to measure stability and structural changes in the long run between the input factor variables.

### RESULT

Table 2. Results of Multiple Linear Regression

Dependent Variable: LOG(ROA)				
Method: Least Squares				
Date: 07/13/20 Time: 13:44				
Sample: 2013M01 2020M03				
Included observations: 87				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(LDR)	0.055990	0.255274	0.219334	0.8270
LOG(VTE)	-0.021096	0.014937	-1.412352	0.1618
LOG(EDC)	0.072752	0.034626	2.101068	0.0388
LOG(JKC)	-1.639559	0.501259	-3.270880	0.0016
LOG(ATM)	-0.325520	0.128432	-2.534575	0.0132
LOG(BOPO)	-0.462601	0.145904	-3.170581	0.0022
LOG(NIM)	-0.267846	0.050008	-5.356072	0.0000
	23.27519	4.632707	5.024101	0.0000
R-squared	0.859468	Mean dependent var		0.948870
Adjusted R-squared	0.847016	S.D. dependent var		0.096060
S.E. of regression	0.037572	Akaike info criterion		-3.637660
Sum squared resid	0.111522	Schwarz criterion		-3.410910
Log likelihood	166.2382	Hannan-Quinn criter.		-3.546355
F-statistic	69.02159	Durbin-Watson stat		1.732379
Prob(F-statistic)	0.000000			

Source: Processing Results Using Eviews 10

### Hypothesis Testing

The model used in the study will be tested several tests to draw conclusions whether the results of the conclusions from

the model are in accordance with the hypothesis or not. The following tests are conducted to test the model against the thesis.



Based on the regression results in Table 2, the LDR t-statistic value is 0.219334 smaller than the t-table (0.219334 < 1.664). Conclusion H0 is accepted, which means that the LDR variable individually does not have a significant effect on the ROA variable at the 95% confidence level.

Based on the regression results in Table 2, the t-statistic value of volume of e-money transactions is 1.412352 smaller than the t-table (1.412352 < 1.664). Conclusion H0 is accepted, which means that the volume of e-money transactions variable individually does not have a significant effect on the ROA variable at the 95% confidence level.

Based on the regression results in Table 2, the t-statistic value of the number of electronic data capture (EDC) machines is 2.101068 greater than the t-table (2.101068 > 1.664). Conclusion H1 is accepted, which means the variable number of EDC machines individually has a significant effect on the ROA variable at the 95% confidence level.

Based on the regression results in Table 2, it is found that the t-statistic value of the number of branch offices is 3.270880, greater than the t-table (3.270880 > 1.664). Conclusion H1 is accepted, which means the variable number of branch offices individually has a significant effect on the ROA variable at the 95% confidence level.

Based on the regression results in Table 2, the t-statistic value of the number of automated teller machine (ATM) machines is 2.534575, greater than the t-table (2.534575 > 1.664). Conclusion H1 is accepted, which means the variable number of ATM machines individually has a significant effect on the ROA variable at the 95% confidence level.

Based on the regression results in Table 2, the operating expenses operating income (BOPO) t-statistic value is 3.170581, greater than the t-table (3.170581 > 1.664). Conclusion H1 is accepted, which means that the individual BOPO variable has a significant effect on

the ROA variable at the 95% confidence level.

Based on the regression results in Table 2, the net interest margin (NIM) t-statistic value is 5.356072 greater than the t-table (5.356072 > 1.664). Conclusion H1 is accepted, which means that the NIM variable individually has a significant effect on the ROA variable at the 95% confidence level.

#### H-Statistical Test

To determine the market structure formed based on the Panzar-Rosse equation model approach. In the Panzar-Rosse approach model, three main variables are used in this study, namely the Loan Deposit Ratio (LDR) as a proxy variable for Credit input factors, E-Money transaction volume as a proxy variable for post-Digital Banking 4.0 technology input factors and the number of EDC machines as a proxy factor. pre-Digital Banking 4.0 technology input. These three main variables are used to generate income in the Digital Banking Era 4.0. Four other variables were used as bank control variables in the study. These three variables are in line with the Bank's approach as an intermediary institution, where the bank functions as a credit channel that is proxied by LDR and collects deposits using technology proxied by E-money and EDC.

From the results of the H-Statistics output obtained for the LDR coefficient value of 0.055990; E-Money transaction volume of -0.021096; The number of EDC machines is 0.072752, thus the total sum of the three input factor coefficients is 0.107646. The accepted hypothesis is  $0 < H < 1$ , where the H-Statistics of 0.107646 provides information that the level of competition in the Indonesian commercial bank industry in the era of digital banking 4.0 is in a monopolistic competition market structure.

## CONCLUSION AND SUGGESTION

### Conclusion

From the research results, it can be concluded as follows that the results

showed that the performance of the Indonesian commercial bank industry in the digital banking era 4.0 as measured by ROA was significant effect by the number of EDC machines, number of branch offices, number of ATM machines, BOPO and NIM. However, LDR<sup>2</sup> and volume of e-money transactions do not have a significant effect on ROA. Furthermore, based on the panzar-rosse model using H-statistics, it shows that the competition that occurred in commercial banks in Indonesia in the era of digital banking 4.0 was included in a monopolistic market structure.

### Suggestion

Based on the conclusions that have been conveyed, it can be suggested that the following are the results of the study which confirms that the variable that has the most significant effect on performance (ROA) is the number of negative branch offices. Other variables such as BOPO, NIM, number of ATM machines and number of EDC machines also have a significant effect<sup>29</sup> ROA in the era of digital banking 4.0. Based on the results of this analysis, it is hoped that the management of Indonesian Commercial Banks can adopt efficiency policies in facing competition in the digital banking era 4.0 which leads to a digital financial ecosystem. The efficiency policy that can be implemented is to reduce input factors that are still on the spot, namely reducing the number of branch offices and the number of ATM machines that no longer have the potential to generate maximum revenue. Then increase the number of EDC machines which are an input factor that continues to experience innovation as a payment facility in the digital banking era 4.0. The management of Indonesian commercial banks also needs to maintain the BOPO and NIM ratios, which are variables that affect ROA. The BOPO and NIM ratios are maintained in order to remain in a safe target condition<sup>43</sup> in order to achieve good performance in accordance with Bank Indonesia regulations and the

Financial Services Authority (OJK) as banking regulators in Indonesia.

It takes the role of Bank Indonesia and the Financial Services Authority (OJK) as government institutions in maintaining and protecting the banking industry in Indonesia, especially at the level of competition in bank and non-bank financial institutions. It is hoped that Bank Indonesia and the OJK will be able to prevent competition from violating Bank and Non-bank financial institutions to maintain financial and monetary sector stability by issuing regulations as financial institution regulators.

The result of predictive ability is 84.70% due to the influence of the research model, leaving 15.30% to allow the latest research to add other financial variables<sup>37</sup> in influencing ROA as the performance of Indonesian Commercial Banks in the Era of Digital Banking 4.0. The latest research is also expected to use Panel data in the Panzar-Rosse model based on bank types, including Islamic banks, rural banks, regional banks or so on so that they can analyze in more detail the behavior that occurs in competition based on more specific bank types. Research with the most recent data and a much larger sample is also expected to produce continuous research<sup>22</sup> intellectual enrichment, especially for the banking industry in Indonesia.

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