

# Efficiency and non-performing loans of comparison between commercial banks in Indonesia and Malaysia

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**ABSTRACT**

Banks play a pivotal role in the economy, serving as intermediaries between those with excess funds and those needing funds. They contribute to both micro and macroeconomic activities in a country. Malaysian banks are operating in Indonesia, some of which have become the largest banks in the country. However, Indonesian banks face challenges in expanding their business in Malaysia. This research investigates the efficiency and determinants of non-performing loans (NPL) of commercial banks in Indonesia and Malaysia from 2014 to 2018. The study utilized variables such as Capital Adequacy Ratio (CAR), Net Interest Margin (NIM), Gross Domestic Product (GDP), Inflation (INFL), and Return on Asset (ROA) of NPL as determinants. The Data Envelopment Analysis (DEA) approach was used to measure the technical efficiency of commercial banks in both countries, and panel regression was used to find the determinants of efficiency and NPL. The findings show that most banks in Indonesia have relatively low efficiency, while banks in Malaysia have high efficiency. However, there was no significant difference between the efficiency of commercial banks in Indonesia and Malaysia. The study also revealed that ROA significantly affected NPL and efficiency for commercial banks in both countries. In contrast, CAR and GDP did not significantly affect NPL and efficiency.

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**1. Introduction**

Banks play a crucial role in a country's micro as part of financial intermediaries; a bank's efficiency is essential, and more attention must be paid to macroeconomic factors that affect banks' performance (Hamid et al., 2017). They act as financial intermediaries that channel funds from individuals with surplus money to those needing funds. Banks accept deposits from society and grant loans to borrowers. Additionally, banks offer various financial services. Banks must adapt to new roles to remain competitive and fulfill the public's needs. For this, banks need to perform well. Good performance involves enhancing efficiency and minimizing risks in their operations.

Efficiency (Mihaiu et al., 2010) is an indicator that measures a company's ability to reduce operational costs without compromising the quality of its products or services. It is a measure of how effectively a task can be accomplished. In the banking industry, efficiency is paramount since banks compete with each other and non-banking financial institutions. The most efficient banks will have a competitive advantage. Financial services also improve when efficiency improves and more funds become available. To achieve efficiency, banks must select appropriate economies of scale. (P. Z. Sari & Saraswati, 2017) suggest that a popular way to measure bank efficiency is through non-parametric Data Envelopment Analysis (DEA).

Various factors can impact a bank's efficiency and non-performing loans (NPL). The increase in NPLs is proven to have an adverse impact on the banking sector, so understanding the determinants of NPLs is crucial to ensure the efficiency and soundness of the overall economy (Rachman et al., 2018). Non-performing loans (NPLs) could be one of the main reasons for economic and financial instability in most of the countries in this world (Rahadian & Permana, 2021), (Zain & Ghazali, 2018). These factors can be categorized into bad luck and bad management. Bad luck refers to external factors beyond the bank's control, such as the economic conditions of the country, which can be influenced by factors like Gross Domestic Product (GDP), inflation, and government decisions (Messai & Jouini, 2013). On the other hand, bad management refers to problems within the bank, such as wrong decisions by the management, incorrect marketing strategies, inefficiencies in production, and other internal factors that the company ratios, such as Loan to Deposit Ratio (LDR), Capital Adequacy Ratio (CAR), bank size, and external factor such as economic growth had a significant effect on bank efficiency (Nugroho & Endri, 2022), (S. Sari et al., 2022).

The cost-to-income ratio is one indicator used to assess a bank's efficiency. This ratio compares the cost of expenses to the profit the bank earns. There are four categories (BUKU 1 until 4) of conventional banks in Indonesia. Categorization is based on the size of the bank. The first category shows that the cost to income of it is still unstable and not good with a high number of it. The second, third, and fourth have a quite stable number for their cost to income each semester. However, the second and third categories still have high numbers, reaching 90%. It shows that the number of expenses is almost the same as income. The third category has decreased after 2016.

The fourth category is the best one compared to the others, with a stable and low-cost income. About 100 banks are operating in Indonesia. As financial intermediaries, banks have to be efficient to stand in the tight competition of this industry (Kingu et al., 2017). The number of banks in Indonesia is decreasing, especially for conventional banks, because some are usually small and cannot keep up with the competition. Those banks solve their problems by merging through acquisition with other big banks, even with other banks from other countries; for instance, Lippo Bank was in an acquisition with CIMB Niaga. Malaysia is a neighboring country with banks operating in Indonesia; some of their banks have even become one of the biggest banks in Indonesia. As explained in the background, banks from Malaysia can expand their business quickly in Indonesia. (Christiani, 2014) Unlike the banks in Indonesia, it is hard for banks from Indonesia to expand their business in Malaysia. Even some banks from Malaysia have invited some banks from Indonesia to join them. Banks may differ in their technical efficiency, affecting their overall performance. The ratio of non-performing loans (NPLs) is a crucial measure of a bank's efficiency. Banks act as intermediaries between depositors and borrowers. A higher NPL ratio can negatively impact a bank's efficiency (Warjiyo, 2021). It is important to note that increasing NPLs does not always lead to decreased efficiency because the clusters of the Indonesian banking system behave differently, as other external factors can also impact the NPL ratio (Islam et al., 2022). NPLs can affect efficiency because if bad loans are high, the bank will incur additional costs to manage the decline in NPLs (Abidin et al., 2021).

The research results are expected to help analyze banks with better performance and efficiency. This knowledge will lead to a deeper understanding of company operations, allowing for prioritization of efficiency and prevention of collapse.

## 2. Research Method

This study employed a quantitative method to collect data that involved measurable aspects with ratios or formulas. The data used in this study were obtained from banks listed on the Indonesia Stock Exchange in 2018 and Malaysia banks, using the purposive sampling method. The data was gathered from each bank's official website and the Bankfocus database. This research utilized descriptive statistics analysis, the Whitney Test, non-parametric data analysis using data envelope analysis (DEA), and panel regression to analyze the data. The descriptive statistics analysis was used to provide a simple summary and graphic analysis of the data in this study. The Mann-Whitney test was used to determine the significant difference between the efficiency of banks in Indonesia and Malaysia. DEA was used to measure the efficiency of banks by utilizing input and output data from financial ratios. DEA is a non-parametric method used to measure and evaluate the efficiency of all units. Panel Regression analysis determined the effect of independent variables on dependent variables in this study. It is formulated as:

$$Y = NPL = \beta_0 + \beta_1 CAR + \beta_2 NIM + \beta_3 GDP + \beta_4 INFL + \beta_5 ROA.$$

$$Y = \text{Efficiency} = \beta_0 + \beta_1\text{CAR} + \beta_2\text{NIM} + \beta_3\text{GDP} + \beta_4\text{INFL} + \beta_5\text{ROA}$$

"Non-performing loans (NPL), Capital Adequacy Ratio (CAR), Net Interest Margin (NIM), Gross Domestic Product (GDP), Inflation (INFL), and Return on Assets (ROA) are represented by  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$ ,  $\beta_5$ , and  $\beta_0$ , respectively.  $\beta_0$  is the intercept or constant (i.e., the value of Y when X1-X5 = 0)."

### 3. Results And Discussions

#### Descriptive Statistics Results

The researchers presented the analysis of the research process, including the descriptive statistics analysis to summarize the data.

**Table 1.** Descriptive statistics results of variables are used (dependent and independent) for banks in Indonesia

	NPL	EFFICIENCY	CAR	NIM	GDP	INFL	ROA
Mean	2.500	0.706	18.288	4.742	5.034	4.294	1.157
Median	2.555	0.681	18.295	4.370	5.000	3.350	1.275
Maximum	6.110	1.000	26.220	9.350	5.170	8.360	2.200
Minimum	0.000	0.280	10.250	2.050	4.900	3.020	0.040
Std. Dev.	1.503	0.240	0.086	1.096	0.095	2.058	0.629
Observation	70	70	70	70	70	70	70

Table 1 and Table 2 show that both dependent and independent variables have lower standard deviation values than the mean. This suggests the values are clustered around the mean, with only slight discrepancies in the maximum and minimum values.

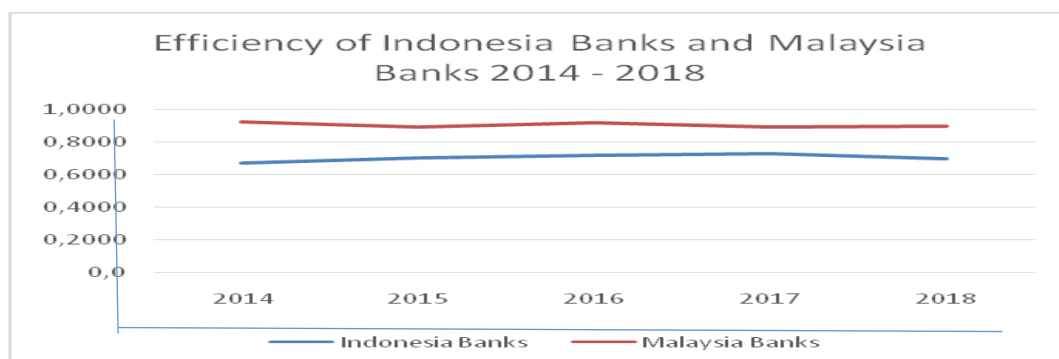
Based on the efficiency results, a higher number indicates greater efficiency for banks, with the maximum efficiency score being 1.0. According to the findings presented in Figure 2, the average efficiency score for Indonesian banks ranges between 0.674 and 0.731, which is relatively low. Of all Indonesian banks, 8 out of 14 (or 57%) have an efficiency score lower than the average of 0.706

**Table 2.** Descriptive statistics of dependent variables and independent variables for banks in Malaysia

	NPL	EFFICIENCY	CAR	NIM	GDP	INFL	ROA
Mean	1.344	0.926	16.238	1.771	5.204	2.418	1.072
Median	1.290	0.945	16.385	1.790	5.090	2.104	1.015
Maximum	2.430	1.000	19.380	2.020	6.000	3.871	1.440
Minimum	0.480	0.780	12.300	1.560	4.450	0.885	0.730
Std. Dev.	0.616	0.079	2.057	0.114	0.127	1.037	0.206
Observation	30	30	30	30	30	30	30

Malaysian banks display higher efficiency scores, ranging from 0.895 to 0.925. Of all Malaysian banks, 4 out of 6 (or 66.6%) have an efficiency score more significant than the average of 0.926. Based on the results presented in Figure 2 reveals that Malaysian banks are more efficient than Indonesian banks.

#### Technical Efficiency Banks in Indonesia and Malaysia



**Figure 2.** Technical efficiency banks in Indonesia and Malaysia  
(Source: Data Envelopment Analysis result, 2021)

### Mann-Whitney Test

The researchers conducted a study to compare the efficiency of banks in Indonesia and Malaysia using the Mann-Whitney Test. The results showed that Asym. Sig. (2 tailed) was 0.158, which is greater than 0.05. When Asym. Sig. (2 tailed) is greater than 0.05, the hypothesis is rejected. The result suggests that there is no significant difference between the technical efficiency of banks in Indonesia and Malaysia.

### Determinants of NPL (Indonesia Banks and Malaysia Banks)

**Table 3.** Result of t-test of Indonesia and Malaysia banks (determinants of NPL)

Independent Variables	Indonesia		Malaysia	
	T-statistic	Prob.	T-statistic	Prob.
CAR	-0.233	0.816	0.417	0.681
NIM	3.484	0.001	1.384	0.179
GDP	0.652	0.540	0.741	0.466
INFL	-2.409	0.019	-0.790	0.436
ROA	-5.489	0.000	-7.244	0.000

Source: The results were obtained using econometric software

According to Table 3, the study concluded that Return on Assets (ROA) is the most influential independent variable that significantly affects banks' Non-Performing Loans (NPL) in Indonesia and Malaysia. While Net Interest Margin (NIM) and inflation (INFL) also significantly affect NPL banks in Indonesia, they do not have the same effect in Malaysia. On the other hand, the Gross Domestic Product (GDP) and Capital Adequacy Ratio (CAR) do not significantly affect the NPL of banks in Indonesia or Malaysia.

### Analysis of the effect of CAR on NPL

To answer the first hypothesis, researchers use multiple regression. The hypothesis for this variable is as follows: a)  $H_0: \beta_1 = 0$ ; CAR significantly affects NPL, b)  $H_a: \beta_1 \neq 0$ ; it means that CAR has no significant effect on NPL.

Based on multiple regressions, researchers have found that the t-statistic of CAR in Indonesia is -0.233 with a probability value of 0.816. This means that the effect of CAR on NPL has been negative and insignificant, indicating no correlation between CAR's movement and NPL in Indonesia. The t-statistic of CAR in Malaysia is 0.417 with a probability value of 0.681, indicating that CAR does not significantly affect NPL.

The researchers have observed a different impact direction of CAR on NPL in banks in Malaysia and Indonesia. In the case of Indonesian banks, the results suggest that CAR can affect the decrease of NPL since CAR has a negative effect on NPL. Conversely, if the CAR effect is positive in Malaysian banks, it will lead to higher NPL. Therefore, if CAR increases, it will also make the NPL higher. These findings align with the (Nadya, 2016) study, which also found that CAR has a negative impact on NPL and does not significantly affect it.

### Analysis of the effect of the NIM on NPL

To answer the second hypothesis, researchers used multiple regression. The hypothesis for this variable is as follows: a)  $H_0: \beta_2 = 0$ ; NIM significantly affects NPL, b)  $H_a: \beta_2 \neq 0$ ; NIM has no significant effect on NPL.

The result of the multiple regression determined that the t-statistic of NIM's effect on the NPL of Indonesia Banks is 3.484 with a probability value of 0.001. It determined that NIM has a positive and significant effect on NPL. It means that if the NIM decreases, the NPL also decreases. In Malaysia, the t-statistic of NIM is 1.384 with a probability value of 0.179. It showed that NIM significantly affects NPL, but unlike the result for Indonesian banks, it does not significantly affect NPL in Malaysian banks. This result is in line with (Kingu et al., 2017) research. The result for the effect of NIM on NPL in Indonesia banks is in line with previous research (Shingjergji, 2013), which stated that NIM has a positive sign and significantly affects the NPL, while NIM in Malaysia banks has no significant effect on NPL.

### Analysis of the effect of the GDP on NPL

To answer the third hypothesis, the researchers used multiple regression. The hypothesis for this variable is as follows: a)  $H_0: \beta_3 = 0$ ; it means that GDP has a significant effect on NPL, b)  $H_a: \beta_3 \neq 0$ ; GDP has no significant effect on NPL.

According to the results of multiple regression analysis, GDP has no significant effect on NPL in Indonesia and Malaysia. The t-statistic of the effect of GDP on NPL in Indonesia is 0.616 with a probability value of 0.540, while in Malaysia, the t-statistic is 0.741 with a probability value of 0.466. In both cases, there is a positive sign towards NPL. These results contradict the findings of a previous study (Scott et al., 2013), which suggested that GDP has a significant negative effect on NPL.

#### Analysis of the effect of Inflation (INFL) on NPL

To answer the fourth hypothesis, the researchers used multiple regression. The hypothesis for this variable is as follows: a)  $H_0: \beta_4 = 0$ ; inflation significantly affects NPL, b)  $H_a: \beta_4 \neq 0$ ; it means there is no significant effect of Inflation on NPL

The results of multiple regression analysis found that the t-statistic of INFL to NPL in Indonesia is -2.410 with a probability value of 0.019. This indicates that INFL has a significant negative effect on NPL in Indonesia. On the other hand, the t-statistic of the effect of INFL on NPL in Malaysia is -0.790 with a probability value of 0.437, which shows no significant effect of INFL on NPL in Malaysia. The effect of INFL on NPL in Indonesia is consistent with the findings of previous research by (Mazreku et al., 2018), which also showed a significant negative effect of INFL on NPL. Therefore, it can be inferred that higher INFL can lead to lower NPL in Indonesia.

However, the result for Malaysian banks is different, as it suggests that INFL does not affect the movement of NPL.

#### Analysis of the effect of the ROA on NPL

To answer the fifth hypothesis, the researchers used multiple regression. The hypothesis for this variable is as follows: a)  $H_0: \beta_5 = 0$ ; it means that ROA significantly affects NPL, b)  $H_a: \beta_5 \neq 0$ ; it means that ROA has no significant effect on NPL.

According to the results of multiple regression analysis, the t-statistic value of ROA to NPL in Indonesia is -5.498, with a probability of 0.000. This indicates that ROA has a significant negative effect on NPL in Indonesia. This result is in line with the study by (Stefano & Dewi, 2022). Similarly, in Malaysia, the t-statistic value of ROA to NPL is -7.244, with a probability of 0.000, revealing a significant negative effect of ROA on NPL. These findings are consistent with the previous research by (Reiffenstein, 2018), who found that ROA has a significant positive effect on NPL. It is worth noting that both Indonesian and Malaysian banks have yielded similar results in this regard (Ludwian & Soekarno, 2022).

#### Determinants of Efficiency (Indonesia Banks and Malaysia Banks)

**Table 5.** Result of t-test for Indonesia and Malaysia banks (determinants of Efficiency)

Independent Variables	Indonesia		Malaysia	
	T-statistic	Prob.	T-statistic	Prob.
CAR	0.568	0.572	-1.490	0.149
NIM	-4.683	0.000	-0.852	0.402
GDP	-0.153	0.879	0.796	0.434
INFL	-0.355	0.724	-1.047	0.305
ROA	5.952	0.000	-2.576	0.017

Source: The results obtained from the Econometrical Software

According to a recent study, ROA (Return on Assets) has the most significant impact on the efficiency of banks in Indonesia and Malaysia. The study also found that other variables such as CAR (Capital Adequacy Ratio), inflation, NIM (Net Interest Margin), and GDP (Gross Domestic Product) do not significantly affect bank efficiency in Malaysia. However, NIM significantly affects bank efficiency in Indonesia. These findings imply that ROA is a crucial factor for bank efficiency in both countries, while NIM is a critical factor specifically for banks in Indonesia (MANGESTI, 2023).

#### Analysis of the effect of the CAR on efficiency

To answer the first hypothesis, the researchers used multiple regression. The hypothesis for this variable is as follows: a)  $H_0: \beta_1 = 0$ ; CAR significantly affects efficiency, b)  $H_a: \beta_1 \neq 0$ ; it means that CAR has no significant effect on efficiency

The result of multiple regression showed that the t-statistic result of CAR to efficiency in Indonesia is 0.568 with a probability of 0.572, which means CAR has no significance. The following statistical analysis

shows that the Capital Adequacy Ratio (CAR) positively impacts efficiency in Indonesia. However, in Malaysia, the result is the opposite - with a probability of 0.149, the statistical result of CAR to efficiency is -1.490, which means that it has no significant effect and a negative sign with efficiency. This outcome is consistent with (Nurwulan & Fikri, 2020) previous research, which also found that CAR has no significant effect on efficiency despite showing a positive sign in the case of Indonesian banks.

#### **Analysis of the effect of NIM on efficiency**

The research analyzed NIM's effect on banks' efficiency in Indonesia and Malaysia. To test the hypothesis, multiple regression analysis was used with the following hypothesis: a)  $H_0: \beta_2 = 0$ , which means that NIM has a significant effect on bank efficiency, b)  $H_a: \beta_2 \neq 0$  means that NIM does not significantly affect bank efficiency.

The result of multiple regression showed that the t-statistic result of the effect of NIM on the efficiency of banks in Indonesia is -4.683 with a probability value of 0.000, indicating that NIM has a significant negative effect on bank efficiency in Indonesia (Sulaeman et al., 2019). On the other hand, the t-statistic result of the effect of NIM on bank efficiency in Malaysia is -0.852 with a probability value of 0.402, indicating that NIM has no significant effect but a negative sign towards efficiency in Malaysian banks. (Triwulanan et al., 2007) also, NIM has no significant effect on efficiency, which aligns with the Malaysian banks' probability value of more than 0.05.

#### **Analysis of the effect of the GDP on efficiency**

To investigate the third hypothesis, the researchers utilized multiple regression analysis. The hypothesis for this variable is presented below: a)  $H_0: \beta_3 = 0$ , which implies a significant impact of GDP on efficiency, b)  $H_a: \beta_3 \neq 0$ , which implies that GDP has no significant effect on efficiency.

A multiple regression analysis showed that in Indonesia, the t-statistic result of GDP towards efficiency is -0.153, with a probability value of 0.879. This suggests that GDP has no significant effect, and it has a negative impact on efficiency in Indonesia. In contrast, in Malaysia, the t-statistic result of GDP towards efficiency is 0.796, with a probability value of 0.434. This means there is no significant effect, but it positively impacts efficiency in Malaysia. These results differ from a previous study (Kusumo & Muljono, 2019), which indicated that GDP significantly affects efficiency in both countries.

#### **Analysis of the effect of the INFL on efficiency**

The researchers used multiple regression to test the fourth hypothesis related to the impact of INFL on efficiency. The hypothesis for this variable is as follows: a)  $H_0: \beta_4 = 0$ , which means there is a significant effect of INFL on efficiency, b)  $H_a: \beta_4 \neq 0$ , which means there is no significant effect of INFL on efficiency.

The multiple regression analysis results indicate that the impact of INFL on efficiency in Indonesian banks is not significant and has a negative sign, with a t-statistic value of -0.355 and a probability value of 0.724. Similarly, the t-statistic result for the effect of INFL on efficiency in Malaysian banks is also insignificant and has a negative sign, with a value of -1.0475 and a probability value of 0.305. This contradicts the findings of (Mazreku et al., 2018), which suggested that INFL has a negative sign and a significant effect on efficiency.

#### **Analysis of the effect of the ROA on efficiency**

To answer the fifth hypothesis, the researchers used multiple regression. The hypothesis for this variable is as follows: a)  $H_0: \beta_5 = 0$ ; it means that ROA significantly affects efficiency, b)  $H_a: \beta_5 \neq 0$ ; it means that ROA has no significant effect on efficiency.

According to the multiple regression analysis conducted, it was found that ROA has a significant positive effect on the efficiency of Indonesian banks, as evidenced by the t-statistic result of 5.952 and probability value of 0.000. On the other hand, the t-statistic result of -2.576 and probability value of 0.017 reveals that ROA significantly negatively affects the efficiency of Malaysian banks. This indicates that the results of Indonesian and Malaysian banks are contrary to the findings of (Efisiensi et al., n.d.), which suggested that ROA has no significant impact on efficiency.

## **4. Conclusion**

In Indonesia, the average efficiency of all banks is 0.7057, and 8 (eight) banks, or 57% of the sample, have an efficiency lower than the average in 2014 – 2018. Most of the efficiency of banks in Indonesia is relatively low. Meanwhile, in Malaysia, the average of all banks is 0.906, which is higher than the average efficiency in

Indonesia. There are 4 (four) banks, or 66% of the sample, that have an efficiency higher than 0.906 in the 2014 – 2018 period. Most of the banks' efficiency in Malaysia is relatively high. Based on the result, the researchers find that Malaysian banks have relatively high numbers for efficiency. The lowest efficiency was 0.808, and the highest was 1.0 in 2014 – 2018. This means that most of the banks in Malaysia have relatively high efficiency in their performance and operation. On the flip side, there are banks in Indonesia that are still low in efficiency. On the other hand, from a statistical point of view, the researchers found no statistically significant difference between efficiency in the Malaysian and Indonesian banks by employing the Mann-Whitney test.

According to the study, ROA is the most significant variable among other independent variables that affect the Non-Performing Loan (NPL) and efficiency of banks in Indonesia and Malaysia from 2014 to 2018. NIM is the second most significant variable that affects the NPL for Indonesian banks, but it differs from Malaysian banks due to the varying ranges of NIM. To attract more clients, Indonesian banks must reduce their NIM, which is higher than that of Malaysian banks. Borrowing from Malaysian banks could be more profitable from a businessman's perspective.

The study implies that a bank's profitability can alleviate the financing problem. If a company's management could increase its profitability, it could reduce credit risk, making it more efficient. GDP and CAR are not significant variables that affect the NPL and efficiency. Any low-efficiency Indonesian bank must focus on its inputs, such as fixed assets. If banks could efficiently use their fixed assets, they would increase net income, increasing their ROA or profitability. The ROA's increase results in a decrease in the NPL, which increases banks' performance. Indonesian banks must maintain the stability of their credit risk to create better performance. The effect of ROA has a negative impact on the NPL, meaning that if NPL decreases, it leads to a higher ROA. The effect of ROA has a positive impact on efficiency, meaning that if ROA increases, it leads to higher ROA. The effect of NIM has a positive impact on the NPL, meaning that if NPL decreases, it leads to a lower NIM. The effect of NIM has a negative impact on efficiency, meaning that if NIM decreases, it leads to higher ROA. Therefore, Indonesian banks must reduce their NIM and increase efficiency to attract more clients and compete with Malaysian banks' NIM.

This research study intends to investigate the impact of bank-specific and macroeconomic variables on non-performing loans (NPL) and the efficiency of conventional banks in Indonesia and Malaysia. The study also aims to explore the differences in the efficiency levels of conventional banks in the two countries. This empirical research aims to fill the gap in existing literature and provide insights into the banking sectors of Indonesia and Malaysia.

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