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Determinants of Return on Assets and Asset Growth In KBMI Group 4 Commercial Banks

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Abstract
The banking industry plays a crucial role in a nation's economy, especially for Indonesia, as developing countries, hence the financial performance of the bank should be maintained continuously to support the real sector. Observing the determinant factors about their performance over time are challenging works, because it might be resulted in variative direction. Therefore, this study have a main objectives where to re-analyse the factors. This study using several variables divided into two terms internal (CAR, NPL, LDR, OER, and NIM) and external (GDP, Inflation rate, and BI Rate) that affect profitability rate and asset growth in Indonesian largest capitalized bank. Panel data regression and VECM are conducted by the author using capitalized commercial banks (KBMI 4) between 2017-2023. Several variables reveal consistent results in the long-run where CAR, LDR, Inflation rate, and BI Rate have positive influence on profitability rate. Furthermore, CAR (+), NPL (-), GDP (-), and BI Rate (+) also reveal a consistent impact toward asset growth. Several implications, especially for governments, of this result further discussed in the last sections.

Keywords: ROA, Asset Growth, KBMI 4, Macroeconomic, Financial Ratios.

1. INTRODUCTION

The banking industry plays a crucial role in a nation's economy. Banking activities involves the collection and disbursement of public funds to support production and consumption efforts. The participation of the banking sector significantly impacts the growth and progress of the domestic economy. The stability of the banking sector has a substantial influence on the overall economic system. A weakening economy in one country can have negative repercussions on both the macro and microeconomic systems of Indonesia, leading to disruptions in financial intermediation.

Almost all industries conducting financial transactions require banking services, especially Indonesia as developing countries. This necessitates that each bank maintain its financial performance to continuously fulfill its intermediation role (Silaban et al., 2018).
Financial performance in the banking sector is usually reflected by its profitability rate. Therefore, achieving sustainable profitability requires banks to demonstrate resilience (Hendrawan & Lestari, 2016). This demand is reflected in the necessity for banks to optimize profits, a goal intrinsically linked to business growth and shareholder interests (Priandini, 2021). A bank's ability to optimize profits can significantly influence the confidence of stakeholders, particularly investors and customers. This ability also demonstrates the bank's capacity to conduct its operations efficiently (Febrianty & Divianto, 2017).

Return on Assets and asset growth are two key indicators used to assess banking performance and growth. ROA measures how well a bank generates profit from its assets, while total assets reflect the bank's scale and ability to operate and lend. Asset growth is an important indicator showing a bank's ability to expand its operational scale, relating to business expansion, lending, and long-term financial stability. Therefore, identifying the determinant factors of the both are important for Indonesia as a developing countries. Majumder & Uddin (2017) in their study towards Bangladesh banks found that Capital

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Adequacy Ratio (CAR) are significantly influence profitability rate measure by ROA. Agam & Pranjoto (2021) also found a similar results towards 41 Indonesian commercial banks. It concludes that CAR has a significant influence on ROA.

Another significant factors are to be found in several studies. Loan to Deposit Ratio (LDR) also has a significant impact on ROA through mediating variables (NIM) (see: Puspitasari et al., 2021; Astuti et al., 2023; and Pakaya et al., 2024). Meanwhile, there are several studies that found no significant effect from LDR (see: Wenno & Laili, 2019; Fachri et al., 2022; and Putri et al., 2024). Puspitasari et al. (2021) conclude in their study that Net Interest Margin (NIM) significantly affects ROA in Indonesian banks between 2015 to 2018. In their study also conclude that ROA is negatively affected by Operating Expenses Ratio (OER). Rachmawati & Marwansyah (2019) in their study for all Indonesian SOE banks also conclude similar results about OER. The others variables also have significant effect for ROA, such as: Inflation rate (Syachfudin & Rosidi, 2020; Widodo et al., 2022), interest rate (Widodo et al., 2022), GDP (Leon 2020; and Syachfudin & Rosidi, 2020).

Not only for probability, but the growth of asset also have several determinant factors. The several studies have developed to identify the factors. NPL is one of the factors that have a significant for the asset growth (lihat Setyawati, 2016). CAR (Indura et al., 2019), LDR (Supriyanto & Sari, 2019), OER (Aini, 2022), and NIM (Putri & Yuliandhari, 2020 and Priandini, 2021) also significantly affect asset growth. The external factors are also significantly affecting asset growth such as: GDP (Sukirno, 2004), inflation rate (Chandra & Anggraini et al., 2020) and interest rate (Septiawan, 2019).

In Indonesia, the banks are currently categorized into 4 groups based on core capital (KBMI): (i) KBMI 1 with core capital up to 6 trillion Rupiah; (ii) KBMI 2 with core capital up to 14 trillion Rupiah; (iii) KBMI 3 up to 70 trillion Rupiah; and (iv) KBMI 4 with core capital exceeding 70 trillion Rupiah. Currently, there are four banks categorized as KBMI 4. These four large core capital banks are Bank Mandiri, Bank Rakyat Indonesia (BRI), Bank Central Asia (BCA), and Bank Negara Indonesia (BNI).

This research focuses on these four major Indonesian banks. These banks were chosen because they have the largest core capital in Indonesia, command a significant market share, and are considered representative of the national banking sector. Therefore, the performance of these banks can potentially affect the real output. Hence, this study have several objectives: (i). Analyse the influence of internal (CAR, NPL, LDR, OER, and NIM) and external (GDP, Inflation rate, and BI Rate) factors toward profitability rate in the Indonesian largest capitalized bank (*KBMI 4*); and (ii). Analyse the influence of internal (CAR, NPL, LDR, OER, and NIM) and external (GDP, Inflation rate, and BI Rate) factors toward asset growth in the Indonesian largest capitalized bank (*KBMI 4*).

2. IMPLEMENTATION METHOD

This study aims to analyze the factors influencing bank profitability (measured by ROA) and asset growth in commercial banks classified under KBMI 4. The research employs CAR, NPL, LDR, BOPO, NIM, GDP, inflation, and the BI Rate as independent variables, with ROA and asset growth as the dependent variables.

Previous research by Hasibuan et al. (2018) and Warsa & Mustanda (2016) demonstrated that CAR has a positive and significant effect on Return on Assets (ROA) in conventional banks in Indonesia. Furthermore, a study by Indura et al. (2019) found that CAR positively and significantly influences asset growth. Hence, the alternative hypothesis can be developed are: ***(H1a) – Capital Adequacy Ratio has a positive significant influence toward ROA; and (H1b) - Capital Adequacy Ratio has a positive significant influence toward asset growth.*** Sudaryanti et al. (2018), Nasution & Oktavi (2016), Warsa & Mustanda (2016), as well as Yudiartini & Dharmadiaksa (2016), demonstrated that NPL has a

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significant negative effect on the ROA of conventional banks in Indonesia. Additionally, a study by Aisy & Mawardi (2016) revealed a negative effect of the NPL variable on total asset growth. Hence, the alternative hypothesis can be developed are: ***(H2a) – Non-Performing Loan has a negative significant influence toward ROA; and (H2b) - Non-Performing Loan has a negative significant influence toward asset growth.*** Supriyanto & Sari (2019) reported positive findings, indicating that a higher FDR reflects strong performance in channeling financing or credit. This suggests that the bank's role as an intermediary institution is functioning effectively, leading to increased bank income, which ultimately contributes to asset growth. Study by Buchory (2015) and Aini (2022) stated that bank performance is significantly and negatively affected by the Operating Expenses Ratio (OER). Based on these study, the hypothesis developed are: ***(H3a) – Operating Expenses Ratio has a negative significant influence toward ROA; and (H3b) – Operating Expenses Ratio has a negative significant influence toward asset growth.*** Pinasti & Mustikawati (2018) menemukan bahwa variabel NIM berpengaruh positif dan signifikan terhadap profitabilitas. Puspitasari et al. (2021) also conclude in their study that Net Interest Margin (NIM) significantly affects ROA in Indonesian banks between 2015 to 2018. Based on these studies, the hypothesis developed are: ***(H4a) – Net Interest Margin has a positive significant influence toward ROA; and (H4b) – Net Interest Margin has a positive significant influence toward asset growth.*** Moreover, Warsa & Mustanda (2016) and Puspitasari et al. (2021) found a similar result on Loan to Deposit Ratio (LDR) toward ROA. Meanwhile, a high FDR indicates effective credit distribution, enhancing bank income and asset growth (Supriyanto & Sari, 2019). Hence, the next alternative hypothesis can be developed are ***(H5a) – Loan to Deposit Ratio (LDR) has a positive significant influence toward ROA; and (H5b) – Loan to Deposit Ratio has a positive significant influence toward asset growth.***

Furthermore, the external factors involved are also influencing the dependent variables. Dhiba (2019) found that GDP are significantly positive influence ROA and asset growth ***(H6a) – GDP has a positive significant influence toward ROA; and (H6b) – GDP has a positive significant influence toward asset growth.*** Inflation rate (Ayerza, 2018; Chandra et al., 2019, and Widodo et al., 2020) significantly negative affect ROA and asset growth. ***(H7a) – Inflation Rate has a negative significant influence toward ROA; and (H7b) – Inflation rate has a negative significant influence toward asset growth.*** Indahsari (2015) and Septiawan (2019) conclude in their study where BI rate has positive significant effect on ROA and asset growth. ***(H8a) – BI Rate has a positive significant influence toward ROA; and (H7b) – BI rate has a positive significant influence toward asset growth.***

Figure … Research Framework

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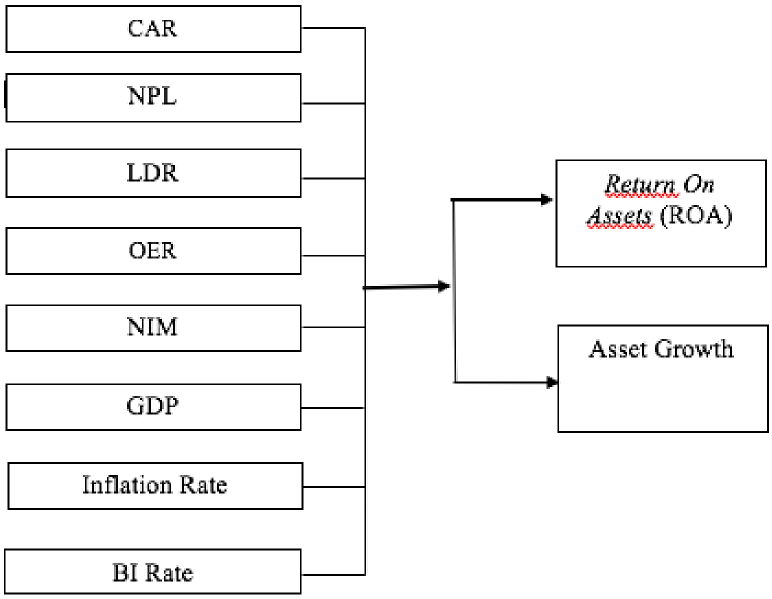


Sources: Authors (2025)

Data collection was conducted from secondary data in the form of financial reports from KBMI 4 commercial banks for the 2017–2023 period, accessed via the respective bank websites or ojk.go.id. The collected data include ROA, asset growth, CAR, NPL, BOPO, LDR, and NIM, while GDP, inflation, and BI Rate data were obtained from bps.go.id or bi.go.id. The data analysis was carried out using the panel data regression method.

Equation 1

$$ROA_{it} = \alpha + \beta 1CAR_{it} + \beta 2NPL_{it} + \beta 3LDR_{it} + \beta 4OER_{it} + \beta 5NIM_{it} + \beta 6GDP_{it} + \beta 7Inflation_{it} + \beta 8BI\ Rate_{it} + dummy_{it} + e$$

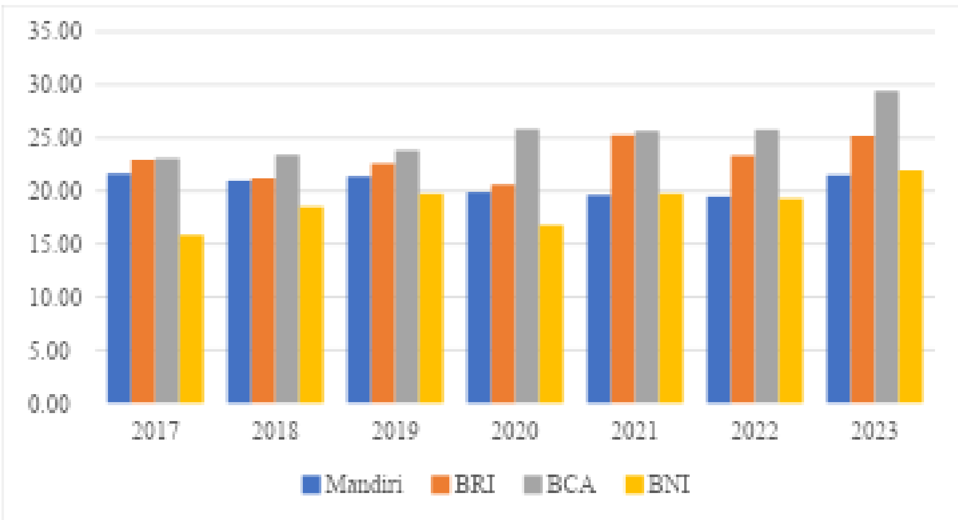
Equation 2

$$Asset\ Growth_{it} = \alpha + \beta 1CAR_{it} + \beta 2NPL_{it} + \beta 3LDR_{it} + \beta 4OER_{it} + \beta 5NIM_{it} + \beta 6GDP_{it} + \beta 7Inflation_{it} + \beta 8BI\ Rate_{it} + dummy_{it} + e$$

3. RESULTS AND DISCUSSION

First, the performance of each variable will be explained, starting with the capital adequacy ratio, non-performing loans, loan-to-deposit ratio, operational efficiency ratio (BOPO), net interest margin, GDP, inflation, and interest rates.

Figure … CAR Performance of The Big Four Indonesian Largest Capitalized Commercial Banks 2017-2023



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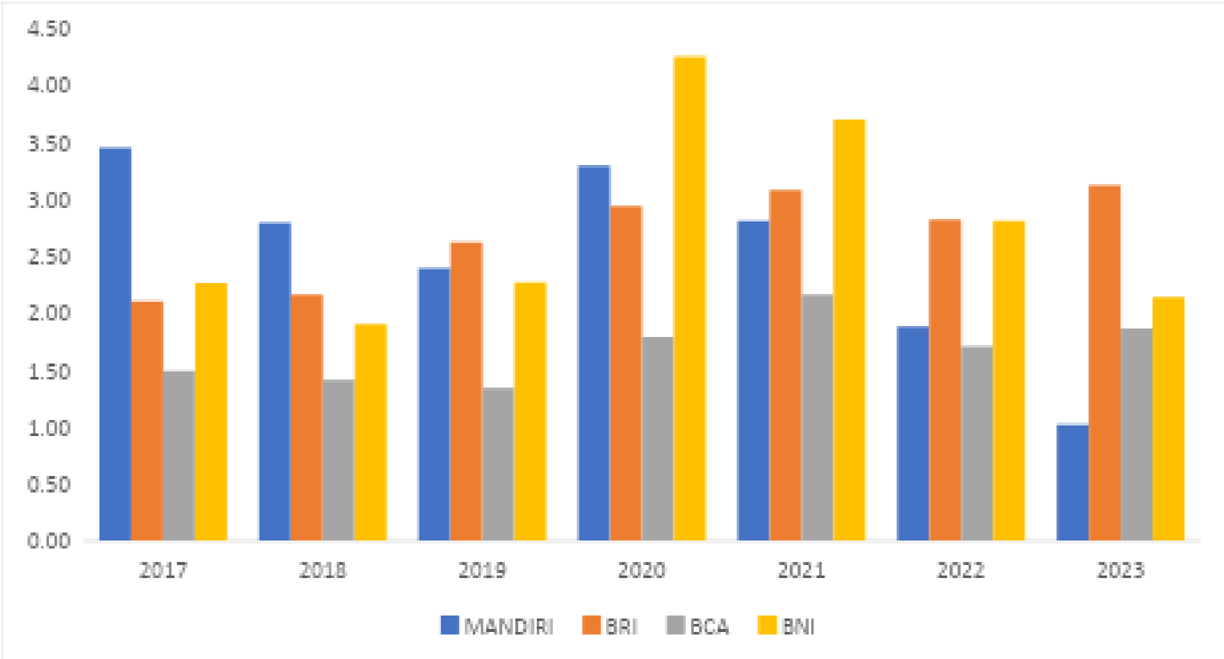
Sources: Data Processed (2025)

The CAR values of all banks in the table indicate a relatively stable trend with minor fluctuations between 2017 and 2023. BCA has the highest CAR compared to other banks, demonstrating a very strong capital position. Among the four banks, BNI had the lowest CAR (15.83% in 2017) but showed a significant increase to 21.95% in 2023. The decline in CAR in 2020 was due to the impact of the COVID-19 pandemic, which led to increased credit risks and liquidity challenges for some banks. CAR recovered during 2021–2023, reflecting economic recovery and banking strategies aimed at strengthening capital structures. The KBMI regulation introduced in 2021 encouraged banks to increase their core capital to meet higher category standards. Banks like BNI, which initially had a low CAR, demonstrated improvement as part of their efforts to strengthen capital positions and competitiveness.

Moreover, the NPL rate of these banks are also been captured by the authors. Here is the diagram showing the point mentioned:

Figure … NPL Performance of The Big Four Indonesian Largest Capitalized Commercial Banks 2017-2023



Sources: Data Processed (2025)

The data shows that the NPL at Mandiri decreased significantly from 3.45% (2017) to 1.02% (2023), indicating an improvement in credit risk management. At BRI, the NPL increased in 2020 (2.94%) and 2021 (3.08%), likely due to the pandemic, but stabilized at 3.12% in 2023. Bank BCA recorded the lowest NPL compared to other banks, reflecting its ability to maintain asset quality, with minimal fluctuations (1.34%-1.86%). BNI experienced a peak NPL in 2020 (4.25%) but managed to reduce it to 2.14% by 2023.

The Loan to Deposit ratio (LDR) of these banks are also been captured by the authors. Here is the diagram showing the point mentioned:

Figure … LDR Performance of The Big Four Indonesian Largest Capitalized Commercial Banks 2017-2023

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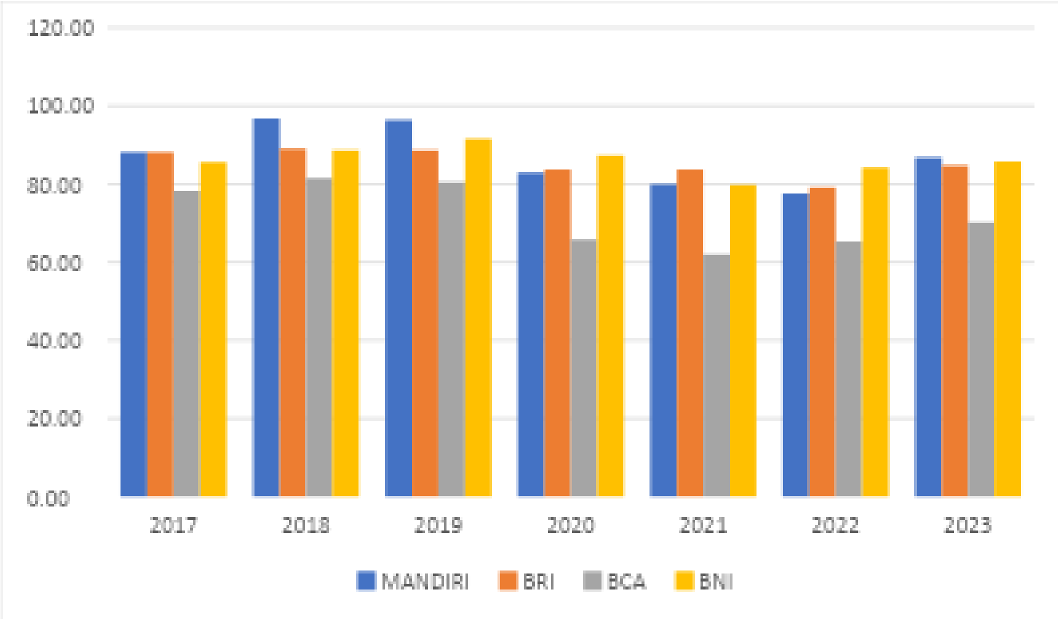
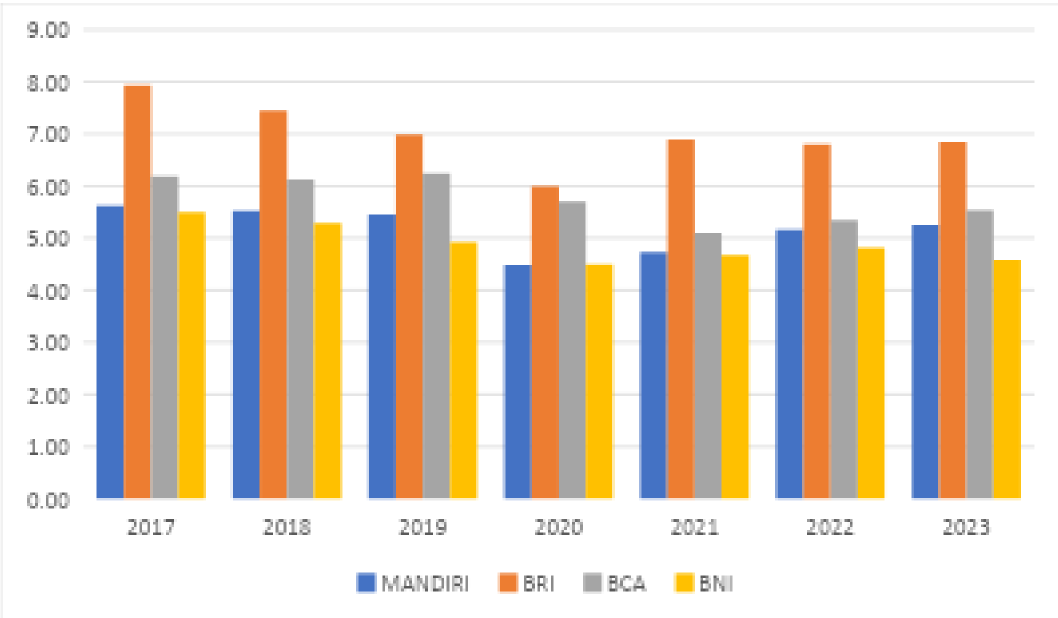


Sources: Data Processed (2025)

The LDR at Mandiri and BRI tended to fluctuate, with relatively high levels in 2018–2019 (above 96%) and a significant decline in 2020–2021 (around 80%), reflecting liquidity management strategies to address the COVID-19 pandemic. The LDR rose again in 2023. BCA's LDR was lower compared to other banks (below 70% in 2020–2021), indicating conservative liquidity management and a stronger focus on deposits rather than lending. Meanwhile, BNI's LDR followed a similar pattern to Mandiri and BRI but returned to a high level in 2023 (85.81%), reflecting credit recovery.

The Net Interest Margin (NIM) of these banks are also been captured by the authors. Here is the diagram showing the point mentioned:

Figure … NIM Performance of The Big Four Indonesian Largest Capitalized Commercial Banks 2017-2023



Sumber: Data Processed (2025)

Bank Mandiri's NIM showed a downward trend, decreasing from 5.63% (2017) to 4.48% (2020) due to the pandemic's impact, which pressured interest income and asset quality. After 2021, it gradually recovered, reaching 5.25% in 2023, reflecting economic recovery. BRI

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Bank consistently had the highest NIM, reflecting its focus on the micro and SME segments, which offer higher interest margins. A decline occurred in 2020 (6.00%) but stabilized above 6.80% since 2021, following improvements in the SME sector. BCA's NIM remained relatively stable, although it briefly declined to 5.10% (2021) before rising again to 5.54% in 2023.

The external factors such as Gross Domestic Product (GDP), inflation rate, and BI rate are also been captured by the authors. Here is the diagram showing the point mentioned:

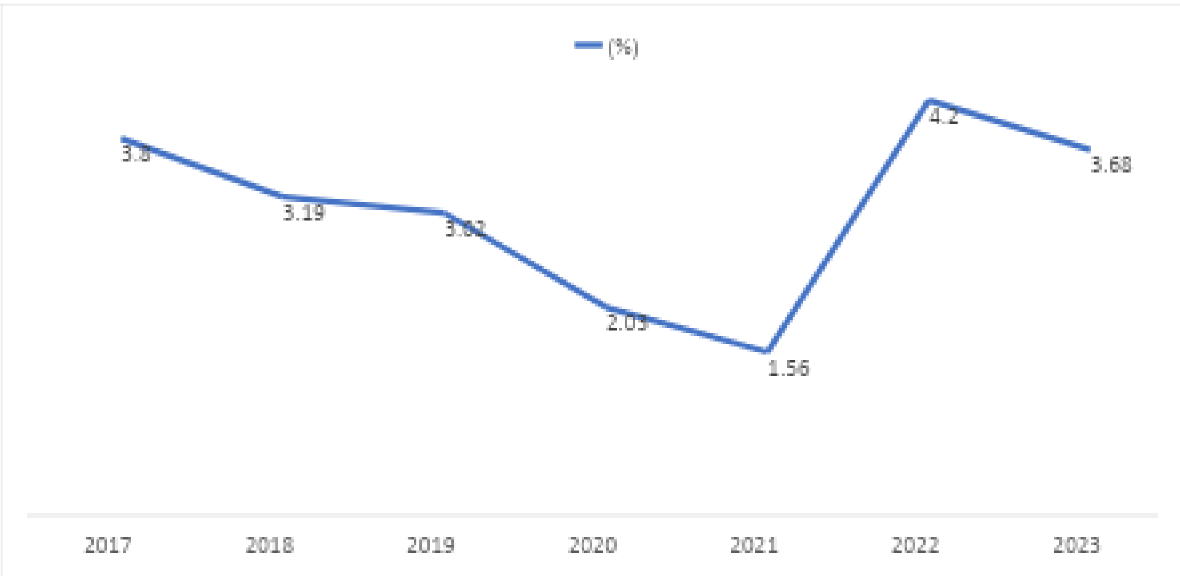
Figure … Indonesia’s GDP Performance 2017-2023

Sources: Data Processed (2025)

GDP during 2017–2019 experienced relatively stable growth. During this period, Indonesia's GDP remained above 5%, reflecting domestic economic stability. In 2019, a slight decline was recorded (5.02%). In 2020, GDP contracted by -2.07% due to the COVID-19 pandemic. A GDP growth rate of 3.70% in 2021 indicated the beginning of economic recovery as the pandemic came under control. In 2022, GDP grew by 5.31%, driven by strong recovery fueled by domestic consumption and investment. The GDP in 2023, at 5.05%, indicates that the economy has begun to stabilize around 5% following the post-pandemic recovery.

Moreover, From 2017 to 2019, inflation was stable and well-controlled, remaining around 3%, in line with Bank Indonesia's target range of 2%-4%, reflecting healthy economic growth. Hre is inflation rate that the authors mentioned before:

Figure … Indonesia’s Inflation Rate 2017-2023



Sources: Data Processed (2025)

In 2020 (2.03%) and 2021 (1.56%), inflation was very low due to the pandemic, reflecting a decline in economic activity and purchasing power. In 2022, a surge in inflation highlighted the effects of rapid economic recovery and external pressures (energy and food prices). By

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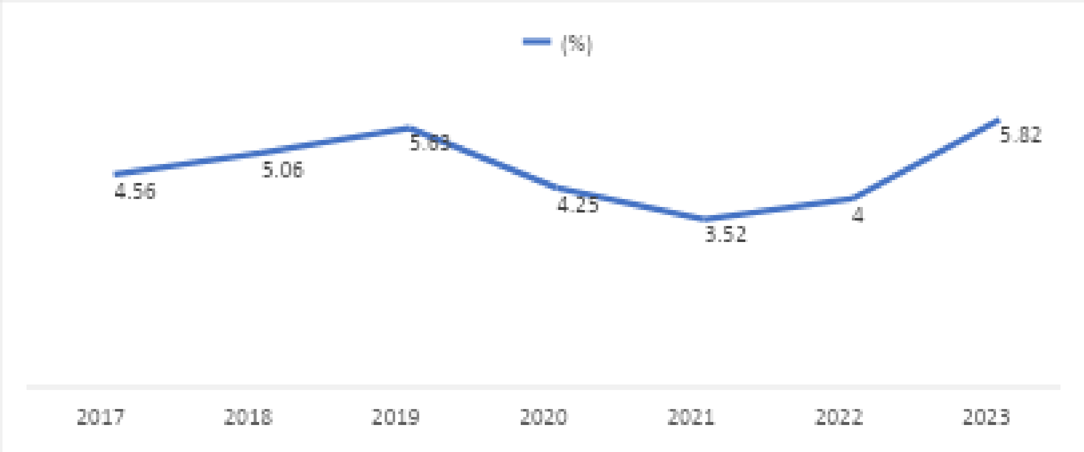
2023, inflation stabilization reflected the success of monetary and fiscal policies in maintaining price stability.

Furthermore, the BI Rate remained relatively stable at 4.56% in 2017, reflecting Bank Indonesia's efforts to control inflation and maintain economic stability. Here is the figure that show the things mentioned before:

Figure … Indonesia's BI Rate 2017-2023



Sources: Data Processed (2025)

Interest rates increased in 2018-2019 to address inflation and ensure market stability. In 2020-2021, Bank Indonesia lowered interest rates to support economic growth hindered by the COVID-19 pandemic. In 2022-2023, interest rates were raised to tackle rising inflation caused by external factors such as surging energy and food prices.

Subsequently, the selection of the best panel data model will be conducted, which includes the Chow Test, LM Test, and Hausman Test. The following are the results illustrating this process:

Table … Panel Data Model Selection

Model	Chow Test		LM Test		Hausman Test		Conclusion
	Tstat	Pvalue	Tstat	Pvalue	Tstat	Pvalue	
ROA	7.5266	0.0469	31.2304	0.0000	0.0000	1.0000	REM
ASSET	199.624	0.0000	136.529	0.0000	0.0000	1.0000	REM

Sources: Data Processed (2025)

The test for selecting the most appropriate panel data model taking several several steps. First, the Chow Test is conducted, where the null hypothesis (H0) assumes the common effect model. The probability value of the Chi-square test is less than 0.05 for all models. Thus, the null hypothesis (H0) is rejected, indicating that the better model to use is the estimation with Individual Effect, represented by the Fixed Effect Model. The next step is to compare the fixed effect with the random effect using the Hausman Test. Based on the Hausman Test results, where the null hypothesis (H0) assumes the Random Effect model, the probability value of the Chi-square test is greater than 0.05 for all models. Therefore, the null hypothesis (H0) fails to be rejected, suggesting that the better model to use is the estimation with the Random Effect Model. The results of the Lagrange Multiplier (LM) Test show a Cross-Section value of 0.000 for both the ROA and asset variables, indicating that the Cross-Section probability value is less than 0.05. Thus, the null hypothesis (H0) is rejected, and the alternative hypothesis (Ha) is accepted. Therefore, the Random Effects Model (REM) is the appropriate model to use.

Furthermore, the hypothesis test are conducting by estimating the model. Here is the table that show the point mentioned:

Table… Hypothesis Test

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Variable	Theory	ROA (REM)		DECISION	ASSET (REM)		DECISION
		Beta	Pvalue (1 Tail)		Beta	Pvalue (1 Tail)	
C		4.693139	0.0000		21.38449	0.0000	
CAR	+	0.012644	0.0497	H1a accepted	0.013128	0.0152	H1b accepted
NPL	-	-0.033136	0.1837	H2a rejected	-0.030737	0.0131	H2b accepted
LDR	+	0.007180	0.0059	H3a accepted	-0.001367	0.2863	H3b rejected
OER	-	-0.069889	0.0000	H4a accepted	-0.002518	0.0801	H4b accepted
NIM	+	0.352643	0.0000	H5a accepted	-0.130137	0.0001	H5b rejected
GDP	+	-0.004452	0.0801	H6a rejected	-0.013030	0.0006	H6b rejected
INF	-	-0.010257	0.0765	H7a accepted	-0.001391	0.4387	H7b rejected
BIRATE	+	0.066751	0.0003	H8a accepted	0.035967	0.0030	H8b accepted
DUMMY		-0.116815	0.0000		0.256200	0.0000	
Goodness of Fit							
R-squared		0.968954			0.883951		
Adjusted R-squared		0.966215			0.873712		
F-statistic		353.7159			86.32668		
Prob(F-statistic)		0.000000			0.000000		

Sources: Data Processed (2025)

Based on the data in the table above, the coefficient of determination or R-squared value is 0.968 or 96% for the ROA model and 0.966 or 96% for the asset model. This indicates that 96% of the variance in the dependent variables (ROA and total assets) is explained by the independent variables, namely CAR, NPL, LDR, BOPO, NIM, GDP, inflation, and the BI rate, while the remaining 4% is influenced by other variables didn't involve in the model.

The estimation results support the studies by Restiyana (2011), Hasibuan et al. (2018), and Warsa and Mustanda (2016), which indicate that CAR has a positive and significant impact on bank profitability, as measured by the ROA ratio. A high CAR increases a bank's ability to generate profit (ROA). This means that the greater the capital adequacy, the better the bank's financial performance in managing assets to generate profit. Banks with high CAR have more capital to bear the risk of losses, enabling them to extend credit more safely and efficiently. According to capital risk management theory, adequate capital helps banks manage risk more effectively. A high CAR demonstrates the bank's ability to absorb losses arising from credit, operational, or market risks. Back (2017-2023) to Indonesia's economic and banking conditions, from 2017 to 2019, Indonesia experienced stable economic growth (approximately 5% annually). This condition allowed banks like Mandiri, BCA, BRI, and BNI to leverage high CAR to expand credit distribution and increase profits. In such conditions, a high CAR provided flexibility for banks to aggressively support business expansion while maintaining manageable risk levels. During the pandemic (2020-2021), credit risk increased due to a decline in borrowers' ability to repay loans. Banks with high CAR were better positioned to withstand economic shocks caused by rising NPLs (Non-Performing Loans). Adequate CAR during this period allowed banks to remain stable and maintain investor confidence despite the economic slowdown. In 2022-2023, during the economic recovery period, banks utilized high CAR to increase credit distribution and productive investments. This contributed to an improvement in profitability. Regarding the positive and significant impact on asset growth, the estimation results are also consistent with previous findings from studies by Indura et al. (2019) and Noualili (2015). This effect indicates that large banks in Indonesia have strong capital capacity to support their asset growth. The latest KBMI regulations further encourage large banks to increase their core capital, thereby enhancing their ability to expand assets and support financial stability. Large banks tend to have robust risk management, enabling them to utilize capital effectively to acquire profitable asset.

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Based on the research conducted by Soares & Yunanto (2018), Liyana & Indrayani (2020), and Karamoy (2020), the results show that the NPL variable does not have a significant effect on ROA. This finding indicates that the business risk of banks, as reflected in NPL, does not significantly affect ROA, although it continues to rise. Moreover, the p-value greater than 0.1 suggests that the relationship between NPL and ROA is not strong enough to be considered significant. This indicates that the impact of NPL on profitability is not dominant or is offset by other factors, such as good risk management or income diversification. Large banks such as Mandiri, BCA, BRI, and BNI have better risk management systems, enabling them to mitigate the negative impact of NPLs on profitability. Credit portfolio diversification, management of loan loss provisions, and operational efficiency can reduce the significant impact of NPLs on ROA. Regarding its impact on asset growth, the estimation results are consistent with the findings of studies by Aisy & Mawardi (2016), which show a significant negative relationship between NPL and asset growth. A high NPL reflects a decline in the quality of the bank's productive assets. Theoretically, an increase in NPL indicates a high credit risk, which requires banks to set aside more provisions for impairment (CKPN). As a result, the bank's capital is under pressure, and its ability to add new assets becomes limited.

Dewi (2017), Hasbullah (2020), and Warsa & Mustanda (2016) state that the Loan to Deposit Ratio (LDR) has a significant positive effect on ROA. An optimal LDR reflects the bank's effectiveness in performing its intermediary function, which ultimately boosts profitability. A high but controlled ratio indicates that the bank is using funds productively to generate interest income without sacrificing liquidity stability. Furthermore, regarding its impact on asset growth, the estimation results align with the statement by Rivai (2007), which suggests that the higher the Financing to Deposit Ratio (FDR), the less liquid the bank is compared to banks with a lower FDR ratio. A high Loan to Deposit Ratio (LDR) can drive asset growth through credit expansion. However, if it becomes too high, liquidity risk increases because reserve funds to meet short-term obligations become limited. During the research period, banks focused more on maintaining liquidity balance rather than aggressive asset expansion, especially during the pandemic. Economic uncertainty made banks more cautious in disbursing new loans, meaning that an increase in LDR did not directly contribute to the growth of total assets.

Setiawan (2016), Hakiim (2018), and Aryfudin & Mulyadi (2020) in their studies found that the OER variable has a negative and significant effect on ROA when examined individually. The estimation results also show similar findings. This indicates that an increase in the OER significantly reduces ROA, thus supporting the alternative hypothesis. The negative coefficient suggests that the higher the OER, the greater the operational burden compared to operational income. This reduces operational efficiency and negatively impacts profitability (ROA). The findings regarding the estimation of OER on asset growth are also consistent with the studies by Buchory (2015), Jakasa (2017), and Aini (2022), where the OER variable has a negative and significant effect on banking asset growth. A high ratio reflects inefficiency in the bank's operational management. This can reduce the profits available for reinvestment, including the expansion of productive assets.

The estimation results for the NIM variable are consistent with findings from studies in 45 Indonesian commercial bank. Anton et al. (2021) found that during the pandemic period, NIM remained a dominant factor in increasing ROA due to the banks' operational efficiency. Between 2017 and 2023, Indonesia's banking sector, particularly Mandiri, BCA, BRI, and BNI, experienced stable economic growth supported by Bank Indonesia's monetary policy. The relatively stable interest rates encouraged banks to maximize interest income. The estimation results for asset growth are also in line with the study by Silaban et al. (2018), which found that NIM has a negative and insignificant effect on profit growth. The negative

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and insignificant influence of NIM on total assets indicates that high net interest income does not directly contribute to total asset growth, particularly in challenging economic conditions such as during the pandemic. Large banks like Mandiri, BCA, BRI, and BNI are expected to focus more on income diversification and credit risk management, ensuring that total asset expansion does not solely rely on NIM.

In the external sector, only the BI rate and inflation have a significant impact on ROA. This result aligns with Abugamea (2016), where inflation has a negative and significant effect on ROA. Meanwhile, the positive and significant effect of the BI rate in the estimation results also corresponds to Indahsari (2015). High inflation can reduce consumers' purchasing power, pressure borrowers' ability to repay loans, and increase the risk of non-performing loans (NPL). This negatively affects the bank's net interest income, thereby it might be impacting the profitability rate. On the other hand, an increase in the BI Rate allows banks to raise lending rates more quicker than deposit interest rates, thereby widening the net interest margin (NIM) and will improve ROA. Regarding its impact on asset growth, the estimation results show consistency with the study by Septiawan (2019), which highlights similar findings. An increase in the BI Rate makes bank deposit interest rates more attractive, encouraging the public to save money in banks. The rise in the BI Rate can attract more funds from the public into the banking sector through deposit products with higher returns, thereby increasing the bank's total assets and third-party funds, which are the main source of bank assets. An increase in the BI Rate is usually followed by an adjustment in lending rates. Although loan demand may slow down, the rise in interest margin helps increase revenue and total assets. Meanwhile, GDP and inflation rate are not significantly influencing the asset growth.

The application of the VECM (Vector Error Correction Model) estimation, in line with the research problem formulation, aims to identify both the short-term and long-term relationships between the independent variables and the dependent variable. The results of the VECM estimation are presented in the table below:

Table … VECM Estimation Result

Dependent Variables	**VECM**			
	ROA		**Asset**	
	Short-run	**Long-run**	**Short-run**	**Long-run**
CAR	-4.183340**	0.216844	-1.821.634	0.029284**
	-169.104	(0.42541)	-724.449	(0.01456)
NPL	0.545038*	-1.311.820	3.146108*	-0.143823**
	(0.41067)	(1.38875)	(1.76989)	(0.04871)
LDR	-0.252423	0.222541*	22.96105	-0.024252***
	-459.600	(0.15960)	-190.252	(0.00546)
OER	-0.498627	0.010732	5.420834	0.046463***
	(5.52971)	(0.12722)	(26.2418)	(0.00401)
NIM	0.014663	-0.918402*	1.091367	-0.202357***
	(0.31324)	(0.65867)	(1.49654)	(0.02403)
GDP	1.751377	8.007533***	-9.260.922	-0.341540***
	(0.63591)	(1.40786)	(7.21115)	(0.04879)
INFLATION	0.289154	22.38061***	-1.960.705	-0.393458***
	(0.39989)	(5.79564)	-176.628	(0.18924)

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BIRATE	0.021906	39.41141***	0.483503	1.167010**
	(0.22211)	-541.753	(0.67615)	(0.19933)

Sources: Data Processed (2025)

Note: Significance levels are indicated as ***1%; **5%; and *10%.

Based on the table above, the variables that influence ROA in the short term are CAR and NPL, with a negative and positive directional impact, respectively. In the short term, an increase in CAR indicates that banks are holding more capital to anticipate risks, thereby reducing the allocation of capital for productive activities such as lending. This results in a decreased ability of banks to generate profits (ROA). In this case, banks may prioritize financial stability amidst economic uncertainty. Regarding the positive impact of NPL, it may be attributed to banks' ability to efficiently manage non-performing loans in the short term. Theoretically, a high NPL reflects a high ratio of problematic loans, which should negatively affect a bank's profitability. However, the positive influence may be explained by the readiness of KBMI 4 banks (Mandiri, BRI, BCA, BNI) to prepare adequate provisions for impairment losses (CKPN). Thus, even with an increase in NPL, the direct impact on ROA can still be mitigated in the short term.

Furthermore, in the long-run, LDR, GDP, Inflation, and BI Rate have a positive significant influence to the ROA, meanwhile NIM has a negative influence. Regarding the impact of LDR, an increase in productive lending contributes to interest income, which ultimately improves ROA. This positive significance indicates that banks have successfully utilized efficient funding strategies to support long-term lending, thereby maintaining liquidity stability and boosting profitability. Furthermore, the positive long-term impact of GDP on ROA may be attributed to the effects of sustainable economic growth, which enhances credit demand, allowing banks to generate higher interest income. Meanwhile, controlled and stable inflation can positively influence bank profitability, as it encourages banks to adjust lending rates in line with inflation, thereby increasing interest income. As for the long-term impact of the BI rate, an increase in the BI rate can lead to higher interest income from loans, especially if banks can adjust lending rates more quickly than the increase in funding costs. On the other hand, the negative long-term impact of NIM may occur if banks continue to increase interest margins or raise lending rates to boost NIM. This could reduce the attractiveness of loans and increase NPLs, thus raising the risk of customer defaults. Ultimately, this would lower ROA.

In the context of asset growth, only NPL which has a positive significant impact on ROA in the short-run. This positive impact may occur because assets are still considered productive despite the increase in non-performing loans (NPL). Banks may experience a rise in NPLs as a result of aggressive credit expansion. However, even with the surge in NPLs, the bank's total assets continue to grow since NPLs are still recorded as part of the bank's assets in financial statements. In the short term, the impact of NPLs on total assets can be positive because non-performing loans are still accounted for as assets. The effects are not yet directly reflected in a reduction of productive assets. In the long-run, asset growth is significantly influenced by CAR, NPL(-), LDR(-), OER, NIM(-), GDP(-), Inflation(-), and BI Rate.

In the long term, KBMI 4 banks with higher CAR exhibit better financial stability, which enhances investor and depositor confidence. This enables banks to expand their assets, for example, by providing more loans or investing in other financial assets. Additionally, OER, which may have a positive impact when maintained at relatively high levels over the long term, can be beneficial if the high operational costs are allocated to strategic investments that contribute to the growth of total assets, and vice versa. Meanwhile, regarding the positive impact of the BI rate, banks can leverage high interest rates to attract more funds, which are then invested in productive assets such as loans or bonds.

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When NPL (Non-Performing Loans) continues to increase sustainably, the quality of a bank's assets declines, eventually reducing the total assets. If NPL levels persistently rise, banks are required to allocate more funds to anticipate potential losses, which can reduce productive assets such as new loans or other investments. This condition has the potential to result in a decline in the total asset value. Furthermore, an excessively high Loan-to-Deposit Ratio (LDR) in the long term may also decrease total assets, as banks face greater liquidity risks and potential losses from bad debts. If LDR continues to rise significantly over an extended period, banks may encounter liquidity challenges due to the excessive utilization of funds for lending. On the other hand, if the Net Interest Margin (NIM) continues to increase without being accompanied by efficient fund management, banks face a decline in assets due to suboptimal allocation. If a bank focuses solely on increasing NIM by excessively raising lending rates, it may reduce the attractiveness of loans for customers, leading to a decrease in credit distribution. Consequently, the bank's total assets may decline in the long run. In the external sectors, an increase in GDP (Gross Domestic Product) that is not accompanied by growth in productive credit demand or investments by banks may also negatively impact assets. Regarding high inflation, it can suppress the purchasing power of individuals and businesses, reducing credit demand and lowering the growth of bank assets. Additionally, high inflation can increase the bank's operational costs, making it difficult for the bank to enhance productive assets.

4. CONCLUSION

This research have two main objectives where to analyze the impact of internal factors (CAR, LDR, NPL, NIM, OER) and external factors (GDP, Inflation, BI Rate) towards bank's profitability measured by ROA and bank's asset growth. This research using two estimation technique (REM and VECM) based on the largest capitalized commercial banks (KBMI 4) in Indonesia between 2017-2023.

In its influence on profitability (ROA), the variables that exhibit consistent results across the two estimation processes (REM and VECM) are CAR, LDR, inflation rate, and BI Rate. Meanwhile, other variables such as NPL show a negative and insignificant effect in the REM estimation, whereas VECM indicates a positive and significant impact in the short term. Additionally, the results for BOPO differ between REM and VECM; REM indicates a significant negative effect, while VECM is not significant. NIM and GDP also display differing results between the two methods. Meanwhile, in the context of their influence on banking asset growth, only the variables CAR, NPL, GDP, and BI Rate show consistent results across the two estimation processes. On the other hand, LDR, BOPO, and NIM demonstrate inconsistent findings.

According to the results, this study have several implications: (i). The KBMI regulation, which promotes strengthening core capital, has positively impacted the stability of the banking system. This policy should be followed by incentives for banks to utilize the increased capital to expand credit to productive sectors; (ii). There is a need to improve operational efficiency. Policies for the digitalization of the banking sector should be expanded to reduce operational costs, particularly for KBMI 4 banks; and (iii)Banks need to develop more innovative products, especially in the digital finance sector, to attract new customers and enhance banking profitability and asset quality.

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