



JOURNAL

THE EFFECT OF OPERATIONAL COSTS TO OPERATING INCOME (BOPO), NON PERFORMING LOAN (NPL), BANK SIZE AND BANK AGE ON PROFITABILITY OF BANKING COMPANIES LISTED ON THE INDONESIA STOCK EXCHANGE

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Abstract:

This study aims to examine and analyze the effect of operational costs to operating income (BOPO), non performing loans (NPL), bank size dan bank age on profitability. The sampling technique used in this research is *purposive sampling*. This study utilizes secondary data in the form of annual financial statements of banking companies listed on the Indonesia Stock Exchange (IDX) for the period 2021 – 2024. The data analysis technique applied is panel data regression using Eviews 13 software. The results of this study indicate that the BOPO variable has a negative and significant effect on profitability. This finding suggests that a higher BOPO indicates that the bank's expenditure for operational activities becomes less efficient. This inefficiency leads to a decrease in the bank's net income, thus resulting in lower profitability. Meanwhile, the variables of non performing loans (NPL), bank size and bank age do not show a significant influence on profitability. These findings emphasize that operational efficiency is the main factor affecting the level of banking profitability. Therefore, bank management is advised to focus more on improving operational cost efficiency to drive an increase in the company's profitability.

Keywords: profitability, BOPO, NPL, bank size, bank age

BACKGROUND

The rapid development of digital technology has brought significant changes across various sectors, including the banking industry. Digital transformation, which was previously considered an optional strategy, has now become an unavoidable necessity for banks to survive and compete in the era of digitalization. The COVID-19 pandemic further accelerated this process, forcing banks to adopt digital-based services to meet customer demands for speed, convenience, and efficiency (Shanti *et al.*, 2022). Physical interaction restrictions during the pandemic pushed almost all banking activities into the digital domain. As a result, the banking sector in Indonesia has undergone a period of accelerated digital transformation to remain competitive and relevant.



The acceleration of financial technology adoption in Indonesia is reflected in the increasing number of digital financial service users. According to the 2021 State of Finance App Marketing Report by AppsFlyer, Indonesia ranks third globally in the number of financial app installations, with approximately 4.7 billion installations recorded worldwide between the first quarter of 2019 and the first quarter of 2021. This surge reflects the growing dependence of Indonesian society on digital financial services such as digital payments, online loans, and mobile banking.

The Financial Services Authority (OJK) through POJK/21/2023 also encourages banks to maximize the use of information technology in providing services to customers. Banks now offer various digital service channels such as phone banking, SMS banking, mobile banking, and internet banking to improve service accessibility and efficiency. This digital service transformation is not only aimed at increasing operational efficiency but also enhancing profitability, customer satisfaction, and market competitiveness.

However, amid the ongoing digitalization process, several banks in Indonesia still face challenges in achieving optimal profitability levels. High operational costs due to technology infrastructure investments, increased competition with fintech companies, and rising credit risks are among the main factors hampering financial performance. Profitability, often measured through Return on Assets (ROA), remains a key indicator of bank performance.

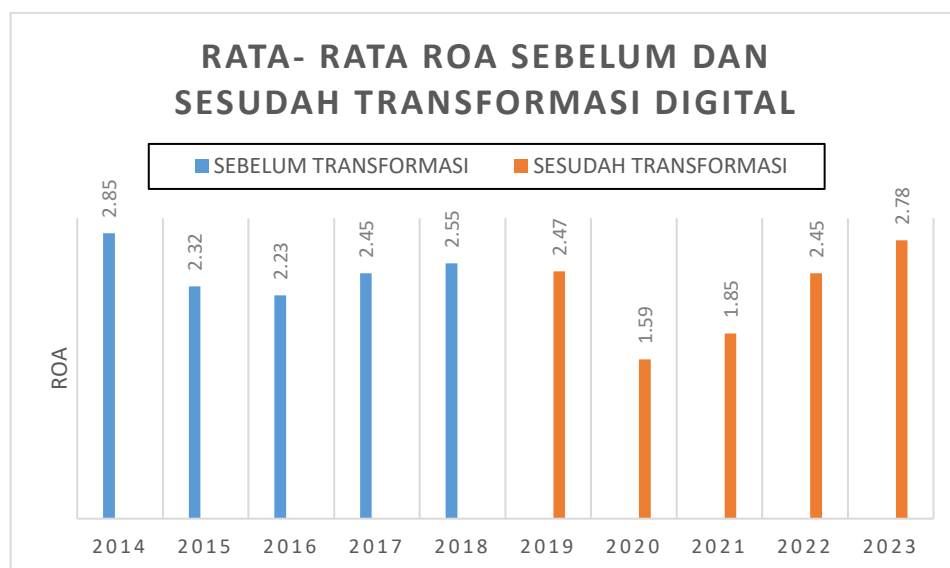


Figure 1. Average ROA of Indonesian Banks

Source: Financial Services Authority, processed by the author (2025)



The average ROA of Indonesian banks in recent years has shown a fluctuating but relatively stable trend within the range of 2.23% to 2.85%. Nevertheless, OJK data shows that several banks still record ROAs below 1%, with some even experiencing negative profitability (OJK, 2024). This condition raises concerns regarding the efficiency and sustainability of digital bank operations.

Table 1. Banks with ROA Less Than 1% Over Five Years

Bank	Tahun				
	2019	2020	2021	2022	2023
Bank IBK Indonesia Tbk	-3,87	-1,75	0,08	0,61	0,92
Bank Jago Tbk	-15,89	-11,27	0,1	0,14	0,49
Bank Capital Indonesia Tbk	0,13	0,44	0,22	0,18	0,64
Bank KB Bukopin Tbk	0,13	-4,61	-4,93	-6,27	-7,71
Bank Neo Commerce Tbk	0,37	0,34	-13,71	-5,2	-2,09
Bank JTrust Indonesia Tbk	0,29	-3,36	-3,06	0,17	0,06
Bank Pembangunan Daerah Banten	-2,09	-3,8	-2,94	-3,46	0,72
Bank QNB Indonesia Tbk	0,02	-1,24	0,04	0,08	0,09
Bank Sinarmas Tbk	0,23	0,3	0,3	0,34	0,54
Bank Of India Indonesia Tbk	0,6	0,49	-1,23	0,14	0,96
Bank Oke Indonesia Tbk	-0,27	0,35	0,38	0,22	0,35
Bank Artha Graha Internasional Tbk	-0,3	0,11	-0,73	0,25	0,6
Bank Mayapada Internasional Tbk	0,78	0,12	0,07	0,04	0,04
Bank Nationalnobu Tbk.	0,52	0,57	0,54	0,64	0,79

Source: Entity Annual Reports, processed by the author (2025)

Based on the data, it can be seen that several banks still have negative ROA levels, while others have ROAs below 1%. This indicates that the profitability and efficiency of asset utilization in these banks remain low. ROA values below the industry average suggest that these banks face challenges in generating profits from their existing assets.

One indicator that reflects operational efficiency is the Operational Expenses to Operational Income ratio (BOPO). A high BOPO value indicates high operational costs relative to the income earned, which can suppress profitability. During the initial phase of digital transformation, many banks experienced a surge in BOPO due to large investments in technology development and human resource training. However, post-pandemic, the BOPO ratio has shown a decline and tends to stabilize, reflecting banks' adaptation in improving operational efficiency (Respati Ningsih & Diana, 2022).



Another important factor in banking profitability is credit risk, measured by the Non-Performing Loan (NPL) ratio. The increasing demand for digital loan services such as Buy Now Pay Later (BNPL) and online microcredit presents new income opportunities but also raises the risk of default. According to OJK data, Indonesian household debt through BNPL schemes reached IDR 7.99 trillion as of August 2024, an increase of 89.20% compared to the previous year (Ramlan, 2024). This development requires banks to be more prudent in managing credit risk to avoid rising NPLs, which can negatively impact profitability.

Bank size, measured by total assets, is also a crucial determinant of profitability. Larger banks generally have more resources to invest in technology, diversify risk, and expand market share. Additionally, older banks with long operational histories are assumed to possess experience, a stable customer base, and mature management, all of which can positively contribute to profitability. However, some studies suggest that large or long-established banks also face challenges related to inefficiency and difficulty adapting to rapid technological changes (Kristiawan & Prasetyono, 2020; Prasetya & Suwarno, 2024).

Previous research has investigated factors affecting banking profitability in general. These studies serve as a foundation for this research. Various studies have examined factors believed to influence profitability, namely BOPO, NPL, bank size, and bank age. Research by Adha & Reviandani (2024) states that BOPO has a negative and significant effect on profitability. High BOPO reflects operational inefficiency, meaning a large cost portion compared to revenue, which can lead to decreased profitability. In contrast, research by Sulisnawati *et al.* (2022) states that BOPO has a positive and significant effect on profitability, suggesting that bank efficiency can be achieved by increasing operational income while controlling operational costs. Furthermore, Safira, Sopingi & Musfiroh (2024) found that BOPO has no significant effect on profitability due to banks' inability to manage funds and assets efficiently.

Research by Fauziah (2021) and Fanny *et al.* (2020) found that Non-Performing Loans (NPL) have a negative and significant effect on profitability, as higher NPL means more bad loans, reducing realized interest income and decreasing profitability. This contrasts with research by Dini & Manda (2020), which states that NPL has a positive and significant effect on profitability because provisions for productive asset write-offs (PPAP) can still cover bad



loan losses. Pratama (2021) found that NPL has no effect on profitability, as low credit risk (<5%) minimizes impact on profits.

Furthermore, Sulisnawati *et al.* (2022) state that bank size positively and significantly affects profitability. Large assets allow more efficient operational and investment activities, directly boosting profitability. However, research by Sukmayanti & Triaryati (2019) found a negative and significant effect, suggesting that larger assets do not always reflect a company's ability to generate profits. Similarly, Oktaviani, Suyono & Mujiono (2019) found no significant effect of bank size on profitability, noting that large-scale companies tend to be more cautious in managing operations due to increased public scrutiny.

Research by Juliana & Melisa (2019) found that company age has a positive and significant effect on profitability. Older firms tend to have more experience, operational stability, and a larger chance of generating consistent profits. In contrast, Hartini (2019) found a negative effect of bank age on profitability, attributing it to the company lifecycle, where longer operations reduce profitability unless continuous innovation and evaluation are undertaken. Similarly, Prasetya & Suwarno (2024) state that company age does not significantly affect profitability, as older banks tend to stick to legacy systems, avoid risky investments, and miss business opportunities, ultimately lowering profitability (Ikrom & Syaichu, 2024).

Given the various factors influencing profitability, there remains room to explore internal factors affecting banking profitability. Changes in the banking industry landscape, such as technology advancements and increased competition, also impact profitability dynamics. Although digital transformation requires large investments and is considered a strategic step to face competition, the use of digital technology has not always been followed by improved banking performance in Indonesia (Thio & Yusniar, 2021). Therefore, this study aims to examine whether factors such as BOPO, NPL, bank size, and bank age significantly affect the profitability of banks that have adopted digital technology, especially in Indonesia. Based on the presented background, the researcher is interested in conducting further research entitled "The Effect of Operational Expenses to Operational Income (BOPO), Non-Performing Loans (NPL), Bank Size, and Bank Age on the Profitability of Banks Listed on the Indonesia Stock Exchange."



THEORETICAL FRAMEWORK

Signaling Theory

Signal theory was proposed by Spence (1973), stating that parties with information provide signals to recipients that reflect the condition of the company. Signaling Theory emphasizes the importance of information conveyed by the company in influencing investors' investment decisions. According to Menurut Mulyana & Daito (2021), the information provided by the company to external parties greatly determines the perception and investment decisions made. In accounting, signaling theory is used to analyze how companies communicate financial information to external parties such as investors, creditors, and regulators. Signaling theory helps to understand how companies provide signals regarding their financial condition to stakeholders outside the organization (Nur *et al.*, 2024).

Profitability

Profitability is a ratio that shows the company's ability to generate profits within a certain period through the utilization of assets and/or equity (Lintang & Ardillah, 2021). According to Tanan (2020), profitability refers to the company's ability to generate profit. Dina & Nana (2022) state that profitability reflects the extent of the company's ability to earn profits from its operational activities. Based on the definitions explained, it can be concluded that profitability is the company's ability to generate profits within a certain period through the utilization of assets, equity, and the operational activities it carries out.

Operational Costs to Operating Income (BOPO)

The Operational Expenses to Operating Income (BOPO) ratio is used to measure the level of efficiency of a bank in managing its operating expenses relative to the operating income it generates. BOPO measures the ratio between operational costs and operating income, where the lower the BOPO value, the higher the efficiency (Chen, 2021).

According to signaling theory, a low BOPO level indicates that the bank operates efficiently, as its operational costs are relatively small compared to its operating income. This becomes a positive signal for the bank, demonstrating its ability to manage costs effectively, which can increase investor confidence in its profitability. Conversely, a high BOPO level indicates that the bank is less efficient, with operational costs too high relative to its income. A



high BOPO ratio can become a negative signal for investors, as it shows that operational expenses exceed the income generated.

Based on several studies, operational efficiency measured by the BOPO ratio has a negative and significant effect on profitability. Research conducted by Dae & Sidik (2024), Fauziyyah & Nurismalatri (2021) dan Astuti (2022) states that BOPO has a negative and significant effect on profitability. The main reason for these findings is that the high operational costs incurred by the bank will suppress the available operating income, thereby reducing the bank's ability to generate profitability. In other words, the higher the BOPO ratio, the more inefficient the bank is in carrying out its operational activities. This inefficiency directly impacts the decline in profitability levels. This is also in line with the opinion of Suryadi, Mayliza & Ritonga (2020), who state that high operational costs will reduce the net income of banking companies. Based on the above description, the following hypothesis can be formulated:

H1: Operational Expenses to Operating Income (BOPO) has a negative and significant effect on profitability.

Non Performing Loan (NPL)

NPL has a negative relationship with profit changes, where an increase in the NPL ratio will lead to a decrease in generated profits, causing profit changes to tend to decline. Conversely, if the NPL ratio decreases, the profits generated will likely increase (Guicheldy & Sukartaatmadja, 2021). The higher the NPL, the more it will lead to a decline in ROA, indicating worsening bank financial performance. On the other hand, if the NPL decreases, ROA will increase, showing that the bank's financial performance is improving (Lestari & Setianegara, 2020).

According to signaling theory, a high NPL can give a negative signal to investors that the bank has problems in managing its credit risk, which can result in low profitability. Conversely, a low NPL level can provide a positive signal to investors that the bank is capable of managing its credit risk, which may lead to increased profitability.

Through studies conducted by Pracoyo & Ladjadjawa (2022), Utomo & Trisnawati (2021) dan Kristiawan & Prasetyono (2020), it is stated that NPL has a negative and significant effect on bank profitability. High NPLs are caused by the inability of customers to fulfill their



obligations, resulting in non-performing loans. Since loans are the main asset and source of bank income, problems in loan repayments can indicate poor bank conditions. If not addressed immediately, this can reduce the bank's ability to generate profits from its assets (Sutrisno, Laksana & Djuwarsa, 2022). Moreover, high NPLs may force banks to increase their Allowance for Impairment Losses (CKPN), which will directly suppress the bank's net income. Thus, it can be concluded that the higher the NPL ratio, the lower the bank's profitability level. Based on this description, the following hypothesis can be formulated:
H2: Non-Performing Loan (NPL) has a negative and significant effect on profitability.

Bank Size

Firm size is a ratio used to measure the scale of a company, whether it is classified as small, medium, or large (Devi & Arinta, 2021). Larger banks usually have several advantages that can enhance profitability, including operational efficiency, access to financing, risk diversification, and market competitiveness. Bank size can influence the income earned, as larger banks tend to have greater capacity to attract customers, provide loans, and seize business opportunities. The larger the size of a bank, generally, its profitability will also increase (Anggari & Dana, 2020).

As the company's total assets increase, banks have more resources to provide loans, expand services, and generate revenue or fee-based income. This contributes to increased profitability and can provide a positive signal to investors regarding better business prospects. A larger firm size can serve as a positive signal to the market, as it reflects stability, investor confidence, and the company's ability to survive amid competition.

Banks can be more efficient in managing costs, have better access to funding sources, and are able to compete in broader markets. This is in line with research by Anastasya & Susilowati (2021) dan Kristiawan & Prasetyono (2020), which state that bank size has a positive and significant effect on profitability, meaning that a larger bank size can drive an increase in bank profitability. Larger companies also tend to be more careful in monitoring and supervising financial reporting to avoid losses, thereby achieving a high level of return (profitability) (Mulyaningtyas & Candra, 2021). Based on this description, the following hypothesis can be formulated:

H3: Bank size has a positive and significant effect on profitability.



Bank Age

Older companies generally have more experience and a better understanding of the needs and expectations of their stakeholders. This experience can help organizations provide more relevant and accurate information, enhancing stakeholder trust in the organization's transparency and credibility (Juliana & Melisa, 2019). Long-standing experience also assists businesses in managing risks and adapting to changes. Ultimately, this supports the company's sustainability and profitability. Moreover, this longevity can serve as a positive signal to investors, indicating that the bank possesses high credibility and trustworthiness.

Companies that have been established for a longer time tend to have higher profitability compared to newly established firms, as new companies typically face larger expenses for marketing, asset purchases, and capital needs (Zuchrinata & Yunita, 2019). The higher level of expenses in newly established firms is also due to unstable sales levels (Rachmita & Ardini, 2019). Theoretically, the relationship between bank age and profitability can be explained through signaling theory. In this context, longer company age serves as a signal that the company has credibility, stability, and management capable of sustaining and growing amidst market dynamics. The positive signal sent is perceived by investors as a form of confidence in the company's performance. Several studies have examined the relationship between bank age and profitability. For example, research conducted by Kristanti, Wiyono & Sari (2024) dan Iman *et al.* (2022) found that company age has a positive influence on profitability. Additionally, a study by Yassim, Wiyono & Mujiono (2020) also stated that company age affects profitability. Based on this description, the following hypothesis can be formulated: H4: Bank age has a positive and significant effect on profitability.

METHOD

This research uses a quantitative research method with a documentation technique, which involves collecting secondary data obtained from banking financial statements. The data analysis method employs panel data regression analysis processed using Eviews 13 software. The population in this study consists of banking companies listed on the Indonesia Stock Exchange (IDX) during the research period of 2021–2024. A sample is a part of the population that can represent it (Raihan, 2017). The sample in this study was selected using the purposive sampling method, which is a sampling technique determined by the researcher based on specific criteria or characteristics of the population that have been previously identified



(Machali, 2021:74). The results of examining the financial reports of banking sector companies listed on the Indonesia Stock Exchange using the purposive sampling method identified the following number of samples:

Table 2. Total Research Sample

Population	Total
Banking companies listed on the Indonesia Stock Exchange (IDX) during the 2021 – 2024 period.	47
Kriteria	
a. Banks that were not consistently listed on the Indonesia Stock Exchange (IDX) during the research period 2021 – 2024.	(1)
b. Banks that are not included in the sharia bank category.	(4)
Bank companies that meet the research criteria for the 2021 – 2024 period	42
Total Sampel (42 banks x 4 years)	168

Source: Processed by the author (2025)

The operationalization of variables in this study was carried out to convert theoretical concepts into forms that can be statistically measured. The dependent variable in this research is profitability, which is proxied by Return on Assets (ROA). Tanan (2020) stated that profitability is the company's ability to generate profit. Profitability can be assessed using financial ratios, one of which is Return on Assets (ROA). The profitability ratio used in this study is ROA because ROA reflects the company's profitability in relation to its total assets (Lazuardi *et al.*, 2023). The independent variables used in this research are Operational Expenses to Operating Income (X1), Non-Performing Loans (X2), Bank Size (X3), and Bank Age (X4).

Table 3. Measurement Method

No	Variable	Measurement Method	Reference
1	Profitability (Y)	$ROA = \frac{Net\ Profit}{Total\ Asset} \times 100\%$	(Nugraha & Afifah, 2023), (Z, Marcelina & Desiana, 2023) dan (Mursalin, Kurniawan & Wati, 2024).
2	Operational Expenses to Operating Income (BOPO) (X1)	$BOPO = \frac{Operational\ Expenses}{Operating\ Income} \times 100\%$	(Putranto, 2019), (Dina & Nana, 2022) dan (Safira <i>et al.</i> , 2024).
3	Non Performing Loan (NPL) (X2)	$NPL = \frac{Non\ Performing\ Loan}{Total\ Loans} \times 100\%$	(Salsabillah & Agustin, 2022), (Aisyah <i>et al.</i> , 2022) dan (Cahyo <i>et al.</i> , 2023).
4	Bank Size (X3)	Bank Size = Ln (Total Asset)	(Anggraeni & Saputri, 2020), (Utari & Viverita, 2024) dan (Nguyen, 2023).
5	Bank Age (X4)	Bank Age = Research Year – Year Established	(Annisa & Praptoyo, 2022), (Adhani & Sitorus, 2022) dan (Yassim, Wiyono & Mujino, 2020).

Source: Processed by the author (2025)



RESULT

Statistic Descriptive

Descriptive static test is an analysis conducted to assess the characteristics of a data by describing the average value (mean), median, maximum, minimum, and standard deviation of the dependent and independent variables. The results of descriptive statistics in this study are shown in the following table:

Table 4. Statistic Descriptive

	ROA	BOPO	NPL	SIZE	AGE
Mean	1.010654	83.14251	2.740429	31.85944	50.38462
Median	0.867334	84.77625	2.681728	31.69366	51.00000
Maximum	3.784670	121.6630	9.080581	35.42552	83.00000
Minimum	-1.035162	43.54642	0.000000	29.07923	23.00000
Std. Dev.	0.873183	13.42958	1.613288	1.608087	16.23989
Skewness	0.911628	-0.650943	1.336879	0.295646	0.060539
Kurtosis	4.040389	4.085978	6.483905	2.069088	1.695129
Jarque-Bera	19.09558	12.45509	83.57514	5.270303	7.441848
Probability	0.000071	0.001974	0.000000	0.071708	0.024212
Sum	105.1080	8646.821	285.0046	3313.382	5240.000
Sum Sq. Dev.	78.53226	18576.41	268.0778	266.3523	27164.62
Observations	104	104	104	104	104

Source: Output Eviews 13 (2025)

Model Estimation Test

Chow Test

Table 5. Chow Test

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	df	Prob.
Cross-section F	6.186289	(25,74)	0.0000
Cross-section Chi-square	117.328532	25	0.0000

Source: Output Eviews 13 (2025)

Based on Table 5, the results show that the cross-section F probability value is 0,000 ($\leq 0,05$). This indicates that, according to the Chow test, the Fixed Effect Model (FEM) is the most appropriate model to use compared to the Common Effect Model (CEM).

Hausman Test

Table 6. Hausman Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. df	Prob.
Cross-section random	10.820522	4	0.0287

Source: Output Eviews 13 (2025)

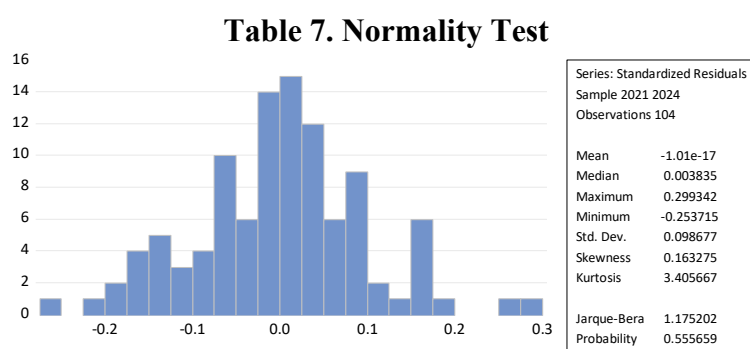


Based on Table 6, the test results show that the cross-section random probability value is 0,0287 ($\leq 0,05$). This indicates that, according to the Hausman test, the Fixed Effect Model (FEM) is the most appropriate model to use.

Classical Assumption Test

Normality Test

Based on the initial normality test on 168 research samples, the data were not normally distributed, as indicated by a probability value below 0.05. To address this, outlier data were identified and removed. A total of 64 outliers were excluded, resulting in a final sample of 104 data points. After outlier removal, the normality test was repeated, showing that the data were now normally distributed with a probability value above 0.05.



Source: Output Eviews 13 (2025)

Based on Table 7, the results show that the probability value from the normality test after removing outliers is 0,5556. This value is greater than the predetermined significance level of 0,05. Based on the results of the normality test, it can be concluded that the data is normally distributed.

Multikollinearity Test

Table 8. Multikollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.235308	781.7843	NA
BOPO	2.97E-06	70.02126	1.763733
NPL	0.000151	5.071120	1.295814
SIZE	0.000171	576.6024	1.451205
AGE	1.49E-06	13.83977	1.291132

Source: Output Eviews 13 (2025)

Based on Table 8, it can be seen that the Centered VIF result for the BOPO variable is 1,7637, for the NPL variable is 1,2958, for the Bank Size variable is 1,4512, and for the Bank



Age variable is 1,2911, all of which are below 10. This indicates that there is no multicollinearity problem among the independent variables in the regression model.

Heterocedasticity Test

Table 9. Heterocedasticity Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.547736	2.105292	-1.685152	0.0962
BOPO	0.000416	0.001084	0.383892	0.7022
NPL	-0.015037	0.009508	-1.581454	0.1180
SIZE	0.133689	0.074057	1.805223	0.0751
AGE	-0.012504	0.007526	-1.661514	0.1008
Effects Specification				

Source: Output Eviews 13 (2025)

The results of the heteroscedasticity test can be seen in Table 9, which shows that all independent variables have probability values (p-values) above 0,05. This indicates that there is no heteroscedasticity problem in the regression model.

More specifically, the Operating Expenses to Operating Income (BOPO) variable has a probability value of $0,7022 > 0,05$, indicating that heteroscedasticity does not occur for this variable. The Non-Performing Loan (NPL) variable has a probability value of $0,1180 > 0,05$, which also does not indicate heteroscedasticity. Furthermore, the Bank Size (SIZE) variable has a probability value of 0,0751 and the Bank Age (AGE) variable has a probability value of 0,1008, both of which are greater than 0,05. Thus, it can be concluded that there are no symptoms of heteroscedasticity in these four variables.

Autocorellation Test

Table 10. Autocorellation Test

Durbin Watson	1,7872
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Source: Output Eviews 13 (2025)

Table 10 shows that the Durbin-Watson value is 1,7872 with a total sample of 104 data points and four independent variables ($k=4$). In this study, the dU value is 1,7610 with $(4-dU)$ equal to 2,2390. Based on the decision criteria $dU < DW < (4-dU)$, which is $1,7610 < 1,7872 < 2,2390$, it can be concluded that the data is free from autocorrelation problems.



Regression Analysis

Table 11. Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.229067	5.144283	-0.044528	0.9646
BOPO	-0.054910	0.002649	-20.72576	0.0000
NPL	0.013841	0.023234	0.595736	0.5532
SIZE	0.147113	0.180957	0.812968	0.4188
AGE	0.021440	0.018389	1.165909	0.2474

Source: Output Eviews 13 (2025)

Based on the test results above, the resulting equation is as follows:

$$\text{ROA} = -0,2290 - 0,0549 \text{ BOPO} + 0,0138 \text{ NPL} + 0,1471 \text{ SIZE} + 0,0214 \text{ AGE}$$

Hypothesis Test

F Test

Table 12. F Test

F-Statistic	197,25
Prob (F-Statistic)	0,0000

Source: Output Eviews 13 (2025)

Based on the test results above, the Prob (F-Statistic) value is $0,000 < 0,05$. This indicates that the regression model is statistically feasible and significant. It means that the independent variables, namely BOPO, NPL, Bank Size, and Bank Age, simultaneously have a significant effect on the dependent variable, Profitability.

T Test

Table 13. T Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.229067	5.144283	-0.044528	0.9646
BOPO	-0.054910	0.002649	-20.72576	0.0000
NPL	0.013841	0.023234	0.595736	0.5532
SIZE	0.147113	0.180957	0.812968	0.4188
AGE	0.021440	0.018389	1.165909	0.2474

Source: Output Eviews 13 (2025)

The results of the t-test statistics presented in Table 13 can be explained as follows:

- The calculated t-value for the BOPO variable is 20,7257, which is greater than the t-table value of 1.660, with a probability value of $0,0000 (< 0,05)$. The beta coefficient for BOPO is -0,0549, indicating a negative direction. Therefore, it can be concluded that BOPO has a negative and significant effect on profitability (H1 Accepted).



- b. The t-value for the NPL variable is 0,5957, which is smaller than the t-table value of 1,660, with a probability value of 0,5532 ($> 0,05$). Thus, it can be concluded that NPL has no significant effect on profitability (H2 Rejected).
- c. The t-value for the bank size (SIZE) variable is 0,8129, which is smaller than the t-table value of 1,660, with a probability value of 0,4188 ($> 0,05$). Therefore, it can be concluded that bank size has no significant effect on profitability (H3 Rejected).
- d. The t-value for the bank age (AGE) variable is 1,1659, which is smaller than the t-table value of 1,660, with a probability value of 0,2474 ($> 0,05$). Thus, it can be concluded that bank age has no significant effect on profitability (H4 Rejected).

Coefficient Determination Test

Table 14. Coefficient Determination Test

R-squared	0,9872
Adjusted R-square	0,9822

Source: Output Eviews 13 (2025)

Based on Table 14, the R-Square value of 0.9872 (98.72%) indicates that the variables BOPO, NPL, Bank Size, and Bank Age collectively explain 98.72% of the variation in profitability. The remaining 0.0128 (1.28%) is influenced by other factors not included in this research model.

DISCUSSION

The Effect of Operating Costs to Operating Income on Profitability

Based on the results of hypothesis testing, the BOPO variable was proven to have a negative and significant effect on banking profitability, thus H1 is accepted. This indicates that the higher the BOPO ratio, the lower the bank's profitability level. The BOPO ratio reflects the level of operational efficiency, where an increase in BOPO indicates higher operational expenses compared to the income generated. The higher the BOPO ratio, the greater the bank's operational costs relative to its operational income, causing profitability to decline. Therefore, an increase in the BOPO ratio will result in a decrease in profitability (Prena & Nareswari, 2022). This result is in line with previous studies by Aurelia & Muchtar (2024), Suryani *et al.*, (2023) dan Fauziyyah & Nurismalatri (2021), which stated that BOPO has a significant negative effect on profitability.

In addition, this finding also strengthens the Signaling Theory, which explains that financial information such as BOPO can serve as a signal to investors regarding the bank's



performance. A high BOPO provides a negative signal concerning the low efficiency of management in controlling operational costs, which in turn affects investor confidence and reduces profits. Descriptive data also supports this result, where a decrease in BOPO was followed by an increase in ROA, as observed in Bank BCA, Bank Ganesha, and Bank Mandiri. This shows that controlling operational costs is a crucial factor in improving bank profitability.

The Effect of *Non Performing Loan* on Profitability

Based on the results of hypothesis testing, the NPL variable was proven to have no effect on banking profitability, thus H2 is rejected. This indicates that the level of non-performing loans (NPL) in the sampled banks remains within a safe and controllable range, so it does not exert direct pressure on the profits generated. The average NPL during the research period was recorded at 2.74%, still below Bank Indonesia's regulatory threshold of 5%.

This result is in line with the studies conducted by Lestari & Setianegara (2020), Syahrul *et al.*, (2024) dan Pratama (2021), which also found that NPL does not have a significant effect on profitability. Although theoretically, NPL reflects credit risk and is considered a negative signal for the bank's financial performance, in practice, the impact is not too substantial. Furthermore, the low NPL level means that banks do not need to establish a large Allowance for Impairment Losses (CKPN), thereby maintaining the bank's profit levels.

The Effect of Bank Size on Profitability

Based on the results of hypothesis testing, the bank size variable was found to have no effect on banking profitability, thus H3 is rejected. This indicates that the total assets owned by a bank do not directly determine the level of profitability. This result is in line with the research conducted by Priharti *et al.*, (2022), Damayanti & Mawardi (2022) dan Mafaza *et al.*, (2025), which stated that bank size does not have a significant effect on profitability. This finding also reinforces the idea that a larger size does not necessarily reflect the efficiency of asset management in generating profits.

Furthermore, empirical data shows an inconsistent relationship between bank size and profitability across the research sample. For example, PT Bank Central Asia Tbk and PT Bank Mandiri Perseroan Tbk, both large-sized banks, recorded high ROA, while PT Bank Tabungan Negara Perseroan Tbk and PT Bank Mayapada Internasional Tbk, despite their large size, continued to show low and fluctuating ROA. This condition indicates that operational



efficiency remains the main factor in determining profitability, not merely the size of the assets owned.

The Effect of Bank Age on Profitability

Based on the results of hypothesis testing, the bank age variable was found to have no effect on banking profitability, thus H4 is rejected. This indicates that the length of time a bank has been established does not directly determine its ability to generate profits. This result is consistent with the research conducted by Mahfi & Usman (2024), Putra (2021) dan Ikrom & Syaichu (2024), which concluded that bank age does not affect profitability. Although according to Signaling Theory, older banks should have a reputation and experience advantage, in reality, age has not been a strong determinant of profitability performance.

Moreover, empirical data shows an inconsistency in the relationship between bank age and ROA across the entire sample. Some older banks were able to record high ROA, but this was not evenly observed across all long-established banks. In fact, there were banks that had existed for a long time but still recorded low ROA. These findings emphasize that age is not the main indicator in determining bank profitability. In the context of modern banking, factors such as adaptability to technology, operational efficiency, and the level of customer trust play a more significant role in determining a bank's profitability.

CONCLUSION

Based on the results of hypothesis testing, this study can provide evidence and conclusions follows:

- a. Operating Cost to Operating Income has a negative and significant effect on profitability.
- b. *Non Performing Loan* has no effect on profitability.
- c. Bank Size has no effect on profitability.
- d. Bank Age has no effect on profitability.

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