

## Navigating Financial Performance: The Influence of NPL and LDR on ROA with Inflation as a Moderating Factor

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**Abstract:** *This study investigates the impact of Non-Performing Loans (NPL) and Loan to Deposit Ratio (LDR) on Return on Assets (ROA) in Indonesian banking from 2017 to 2023, with inflation examined as a moderating factor. Using panel data regression analysis on 301 observations from 43 banking companies listed on the Indonesia Stock Exchange, the study finds that NPL negatively affects ROA but lacks statistical significance, contrary to expectations from the bad management hypothesis. In contrast, LDR positively and significantly influences ROA, supporting the Anticipated Income theory. Moderation analysis reveals that inflation does not significantly moderate the relationships between NPL and ROA, nor LDR and ROA. These findings suggest that while inflation impacts economic conditions and investment decisions, its direct effect on bank profitability through NPL and LDR is limited. The findings imply that enhancing managerial competencies in credit assessment and risk management is crucial for mitigating NPL risks and improving bank profitability. Banks should also prudently manage LDR to maximize profitability while considering credit risk. Effective inflation risk management strategies are recommended despite its minimal direct impact on NPL and LDR effects on ROA. Future research should explore additional factors influencing these relationships, including regulatory policies and macroeconomic conditions.*

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## INTRODUCTION

The banking sector plays a crucial role as an economic pillar in any country. Banks significantly contribute to capital provision across all economic sectors, supporting national economic growth (Nugraha et al., 2021). Currently, banks facilitate nearly all financial transactions, from local domestic markets to international trade in both private and government sectors. Beyond transaction services, banks also offer investment products and loans, which constitute the core of their business operations (Khoirunisa et al., 2022). Loan products remain the primary focus of banking operations in Indonesia, possibly due to their dominant contribution to revenue compared to other financial services.

In loan disbursement, Non-Performing Loans (NPL) pose a common risk for banking management. A lower NPL rate generally correlates with higher profitability, particularly when Loan to Deposit Ratio (LDR) dominates fund allocation. With an increasing number of banks in Indonesia, competition intensifies, leading to higher risks of poor-quality loans (Kartikasary et al., 2020). Efforts to increase loan disbursement may elevate NPL, as banks might overlook borrower creditworthiness (Shonhadji, 2020). Banks strive to keep NPL below 5% of total loans to avoid intensive supervision by the Financial Services Authority (OJK) (PERATURAN BANK INDONESIA, 2013)

The banking sector's role in national economic dynamics lies in its ability to provide business capital to accelerate economic circulation, thus promoting dynamic economic growth. Additionally, financial services facilitate faster, accurate, and reliable transactions, ensuring security and convenience for all parties involved. Effective loan disbursement for business capital and reliable financial services greatly assist management in achieving desired profitability targets. Profit quality interprets a bank's capability; poor profit quality reflects an inability to fund customer credit needs (Martiningtiyas & Nitinegeri, 2020).

Previous research has shown that NPL and LDR positively influence profitability, while inflation fails to moderate NPL and LDR's impact on profitability based on banking data from 2018-2022 (Handayani et al., 2024). This study aims to provide a broader analysis using data from 2017-2023 across all banks in Indonesia to draw more objective conclusions.

The Covid-19 pandemic from 2020-2023 significantly impacted the economy across all sectors related to banking in Indonesia. During the pandemic, inflation was deemed not to affect the high NPL (Musta'da & Pramono, 2022), but this does not fully describe conditions from before to after the pandemic.

Positive impacts emerged from the analysis of NPL and LDR on profitability, denoted by Return on Assets (ROA) for banks listed on the Indonesia Stock Exchange from 2014-2018 (Abdurrohman et al., 2020). This study should further develop with additional variables and test inflation as a moderating variable to determine whether simultaneous price increases affect borrowers' ability to meet loan obligations in banks.

## **LITERATURE REVIEW**

### **Non-performing Loan**

In the bad management hypothesis proposed by Berger and Young (1997) and examined in the research by Asysidiq & Sudiyatno, (2022), it is stated that poor bank governance is caused by internal factors. Poor management affects the bank's profits due to low-cost efficiency and the quality of credit provided to debtors. This often occurs because managers are not competent in carrying out various activities, such as credit scoring, collateral assessment, and debtor supervision. These management errors eventually lead to Non-Performing Loans (NPL). Non-Performing Loans are a ratio used to measure a bank's ability to mitigate the risk of credit default by debtors (Widyastuti & Aini, 2021).

Sunaryo (2020) states that the higher the Non-Performing Loans (NPL), the lower the credit quality and the greater the risk of credit default, leading to an increase in bad loans and a decrease in interest income and profits, thus reducing the bank's Return on Assets (ROA) due to the loss of income opportunities from bad loans. This is supported by the research of Wijayani, (2023); Pinasti & Mustikawati, (2018); Laryea et al., (2016); Bhatrai, (2017); Ramdani, (2018); Bagus & Taswan, (2019) and Abel & Le Roux, (2016).

H<sub>1</sub>: Non-performing loans have a negative effect on return on assets.

### **Loan to Deposit Ratio**

Loan to Deposit Ratio (LDR) is a measure that describes the bank's ability to borrow and repay funds to customers and to fulfill loan requests from debtors. As explained by Pinasti & Mustikawati, (2018) , "placement in the form of credit is one of the productive assets that contributes relatively high income". Therefore, the higher the Loan to Deposit Ratio (LDR), the bank's Return on Assets (ROA) tends to increase due to increased potential income from the placement of productive assets (Maulida, 2021).

This relationship is consistent with the Anticipated Income theory proposed by Haslem (1984) in the study Asysidiq & Sudiyatno, (2022), which indicates that the greater the allocation of credit, the greater the funds tied up in credit, leading to a lower probability of repaying public deposits. However, an increase in credit allocation also means increased profit potential for the bank. In line with studies by Nugraha et al., (2021); Do et al., (2020); Aliu & Çollaku, (2021) ; Psaila et al., (2019); Caliskana & Lecunab, (2020) and Dewi, (2022), it is indicated that LDR has a positive impact on ROA.

H<sub>2</sub>: Loan deposit ratio has a positif effect on return on assets.

### **Inflation**

According to Keynes' theory, inflation can affect non-performing loans and bank profitability, which is reflected in declining currency values, declining income levels, rising goods prices, rising interest rates, and economic instability (Handayani et al., 2024) . When inflation increases, people tend to use their wealth to meet expenses due to rising prices of goods (transaction motive), which may lead to difficulties in repaying their loans (Keown et al., 2017) . This impact has the potential to increase the level of non-performing loans and affect bank profitability (Rachmawati & Marwansyah, 2019) . Research Maya, (2019) found that inflation is able to moderate the effect of non-performing loans on profitability.

H<sub>3</sub>: Inflation is able to moderate the relationship between non-performing loan and return on assets.

In Keynesian theory, inflation can cause economic instability, which is reflected in rising prices, currency depreciation, and rising central bank interest rates (Handayani et al., 2024). The increase in interest rates changes the investment strategy of banks so that banks prefer to keep funds at the central bank rather than lending to the public (Ridhwan, 2016). As a result, the Loan to Deposit Ratio (LDR) decreases and ultimately affects bank profitability due to reduced interest income from loans.

H<sub>4</sub>: Inflation is able to moderate the relationship between loan to deposit ratio and return on assets.

### **METHOD**

The research method employed is quantitative descriptive. Data collection was conducted using secondary data obtained from the IDX (Indonesia Stock Exchange) website and financial reports of the companies. The population of the study consisted of banking companies listed on the Indonesia Stock Exchange during the period from 2017 to 2023. Sample selection utilized purposive sampling technique, which involves selecting participants based on specific criteria relevant to the research objectives (Sekaran & Bougie, 2016)

In this study, the purposive sampling method was used to select a sample of 43 banking sector companies that met the following criteria: (1) Listed on the Indonesia Stock Exchange from 2017 to 2023, and (2) Published their financial reports for the same period. This method ensured that the sample was representative of the population of interest and suitable for research objectives.

This study uses panel data regression techniques to examine the effect of independent variables (Non-Performing Loan/NPL and Loan to Deposit Ratio/LDR) on the dependent variable, namely profitability as measured by Return on Asset (ROA). The analytical tool used in this study is EViews 12. After multiple regression analysis, an interaction test is conducted using inflation as a moderating variable to determine whether the moderating variable can moderate the relationship between the independent and dependent variables. The regression equation used consists of two stages (Rianto Rahadi & mifta Farid, 2021), as follows:

$$ROA_{it} = \alpha + \beta_1 NPL_{it} + \beta_2 LDR_{it} + \epsilon_{it}$$

$$ROA_{it} = \alpha + \beta_1 NPL_{it} + \beta_2 LDR_{it} + \beta_3 INF_{it} + \beta_4 NPL \cdot INF_{it} + \beta_5 LDR \cdot INF_{it} + \epsilon_{it}$$

Information:

ROA	: Return On Assets
$\alpha$	: Constant
$\beta_1 - \beta_5$	: Regression Coefficient
NPL	: Non-Performing Loan
LDR	: Loan to Deposit Ratio
INF	: Inflation
$\epsilon$	: Standar Error

## RESULT AND DISCUSSION

### Descriptive Statistic

This study utilizes financial report data from banking companies listed on the Indonesia Stock Exchange for the period 2017–2023, comprising 301 observations.

Table 1. Descriptive Statistic

	ROA	NPL	LDR	INF
Mean	0.823023	1.663522	87.18847	3.018571
Median	0.860000	1.200000	85.38000	2.720000
Maximum	13.58000	9.920000	373.6100	5.510000
Minimum	-15.89000	-3.300000	0.700000	1.680000

Table 1 presents the mean, median, maximum, and minimum values for each research variable. The mean value for the ROA variable is 0.82%, which is classified as rank 3 or fairly healthy because it falls between 0.5% and 1.25% (Peraturan Bank Indonesia, 2011), with a maximum value of 13.58% and a minimum value of -15.89%. The NPL variable has a mean value of 1.66%, classified as rank 1 or very healthy because it is less than 2%, with a maximum value of 9.92% and a minimum value of -3.30%. The mean value for the LDR variable is 87.19%, classified as fairly healthy or rank 3, as it ranges between 85% and 100% with a maximum value of 373.61% and a minimum value of 0.70%. The mean value for the inflation variable is

3.02%, categorized as mild inflation, with a maximum value of 5.51% and a minimum value of 1.68%.

### **Determination of Regression Model**

#### **Chow Test**

Decision making in the chow test is if prob. Cross section Chi-square  $<0.05$  then Fixed effect is selected, otherwise when prob. Cross section Chi-square  $> 0.05$  then the common effect is selected (Marlina et al., 2022).

Table 2. Chow Test

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	6.620386	(42,253)	0.0000
Cross-section Chi-square	223.184996	42	0.0000

Based on the chow test results in table 2, it is known that prob. Cross section Chi-square  $<0.05$ , which is 0.0000  $<0.05$ . it can be concluded that the Fixed effect model is temporarily selected. Due to the selected fixed effect, then do the Hausman test.

#### **Hausman Test**

Decision making in the hausman test is if prob. Cross section random  $<0.05$  then Fixed effect is chosen, otherwise when prob. Cross section random  $> 0.05$  then random effect is selected (Napitupulu et al., 2021).

Table 3. Hausman Test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	24.015523	3	0.0000

Based on the chow test results in table 3, it is known that prob. Cross section random  $<0.05$ , which is 0.0000  $<0.05$ . it can be concluded that the Fixed effect model is chosen, so the research regression model used is the Fixed Effect Model.

#### **Multicollinearity Test**

In a well-specified regression model, there should be no correlation among the independent variables. According to Napitupulu et al., (2021) and Fungki et al., (2023), the basis for this determination is as follows:

- If the correlation value between each pair of independent variables is less than 0.85, then  $H_0$  is accepted, indicating that there is no multicollinearity problem.
- If the correlation value between each pair of independent variables is greater than 0.85, then  $H_0$  is rejected, indicating that there is a multicollinearity problem.

Table 4. Multicollinearity Test

	NPL	LDR	INF
NPL	1.000000	-0.010626	-0.031552
LDR	-0.010626	1.000000	0.036002
INF	-0.031552	0.036002	1.000000

Based on Table 3, the results of the multicollinearity test show that the coefficient values for each variable are  $< 0.85$ . Therefore, it can be concluded that this study does not encounter multicollinearity issues.

### Heteroskedasticity Test

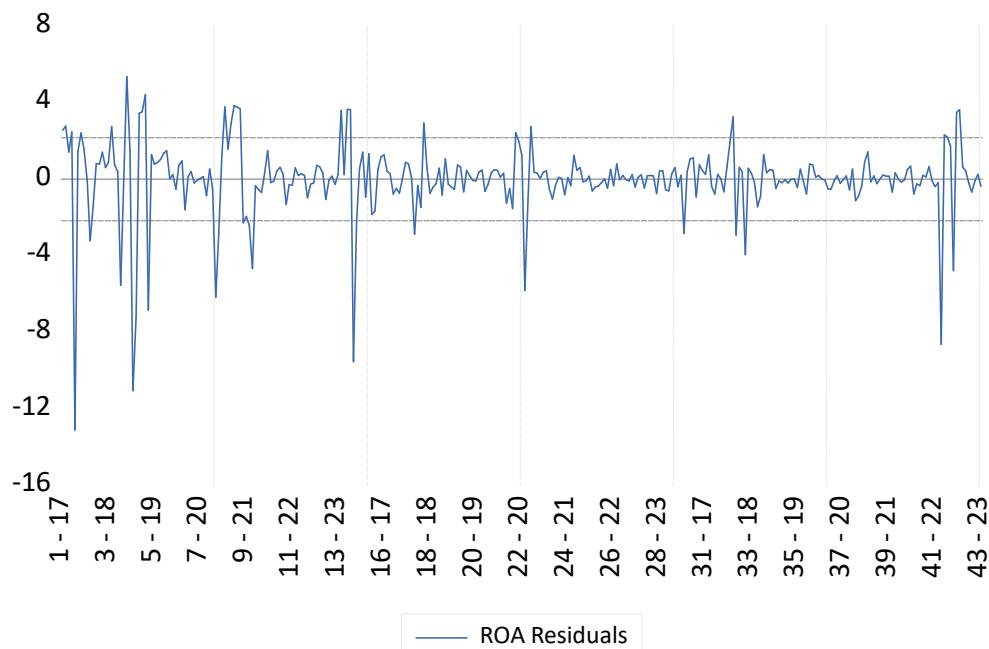


Figure 1. Heteroskedasticity Test

Based on Figure 1, the results of the heteroskedasticity test indicate that the residual values fall between 8 and -15, which do not exceed the bounds of 500 and -500 ( $8 < 500$  and  $-15 > -500$ ) (Napitupulu et al., 2021). This indicates that the residual variance is consistent, thus there is no evidence of heteroskedasticity or the test for heteroskedasticity is passed

### Hypothesis Test

After conducting the classical assumption tests, significance testing was performed on the panel data regression using the fixed effects model as follows:

Table 5. Hypothesis Test

Dependent Variable: ROA  
Method: Panel Least Squares  
Date: 06/29/24 Time: 16:58  
Sample: 2017 2023  
Periods included: 7  
Cross-sections included: 43  
Total panel (balanced) observations: 301

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.518792	0.576594	-0.899753	0.3691
NPL	-0.000847	0.121194	-0.006990	0.9944
LDR	0.015406	0.005927	2.599183	0.0099
Effects Specification				
Cross-section fixed (dummy variables)				
Root MSE	2.011117	R-squared	0.576736	
Mean dependent var	0.823023	Adjusted R-squared	0.503988	
S.D. dependent var	3.096382	S.E. of regression	2.180724	
Akaike info criterion	4.534261	Sum squared resid	1217.423	
Schwarz criterion	5.088480	Log likelihood	-637.4063	
Hannan-Quinn criter.	4.756036	F-statistic	7.927820	
Durbin-Watson stat	1.856756	Prob(F-statistic)	0.000000	

Based on the results from Table 5, it can be observed that the partial effect of non-performing loans on return on assets (ROA) has a regression coefficient of -0.000847. This means that for every 1% increase in non-performing loans, ROA is expected to decrease by 0.0847%, assuming other independent variables remain constant. The significance value of the non-performing loans variable is 0.9944, which is greater than 0.05. Therefore, it can be concluded that non-performing loans have a negative but statistically insignificant impact on return on assets. Hence, the alternative hypothesis ( $H_1$ ) is rejected. This implies that each increase in NPL results in an insignificant decline in ROA, indicating that the bank has not fully performed its intermediation function in extending credit to the public, and the available funds are still placed in interbank placements.

The insignificant effect of NPL on ROA indicates that non-performing loans do not significantly reduce bank profits. The lower the NPL of a bank, the better the credit quality, so that the number of non-performing loans is less and the risk of the bank getting into trouble is smaller. Non-performing loans include loans with substandard, doubtful, and loss status. The NPL ratio's level does not affect the ROA ratio because the number of customers failing to fulfill their obligations is small, so the bank's interest income does not fluctuate. This contradicts the bad management hypothesis, which posits that problematic or non-performing loans arise from poor bank management, caused by incompetent managers in activities such as credit scoring, collateral assessment, and debtor supervision. This is consistent with studies Sunaryo, (2020) ; Zulfikar, (2014) ; Yulita et al., (2020) stating that NPL has no significant impact on ROA.

Variable loan to deposit ratio has a regression coefficient of 0.015406, indicating that a 1% increase in the loan to deposit ratio is associated with an increase in return on assets (ROA) by 1.5406%, assuming that other independent variables remain constant. The significance value of the loan to deposit ratio variable is 0.0099, which is less than 0.05. Therefore, it can be concluded that the loan to deposit ratio has a statistically significant positive impact on return on assets. Hence, the alternative hypothesis ( $H_2$ ) is accepted.

The results of this study support Haslem's Anticipated Income Theory (1984), which states that the more credit provided by the bank, the more funds are tied up to fulfill credit repayment obligations. This means that less public funds are available. However, an increase in credit allocation also opens up opportunities for banks to earn more profits by extending credit

to parties that are considered capable of paying on time. This shows how important it is for banks to properly manage their loan allocation strategy to generate maximum revenue while still considering the risks and balanced availability of funds for the public. The results of this study are in line with research Nugraha et al., (2021); Do et al., (2020); Aliu & Çollaku, (2021); Psaila et al., (2019) ; Caliskana & Lecunab, (2020) and Dewi, (2022) which reveal that LDR has a positive impact on ROA.

### Hypothesis Test with Moderating Variable

Table 5. Moderating Regression Analysis Test

Dependent Variable: ROA  
 Method: Panel Least Squares  
 Date: 06/29/24 Time: 17:05  
 Sample: 2017 2023  
 Periods included: 7  
 Cross-sections included: 43  
 Total panel (balanced) observations: 301

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.668303	1.121602	-2.379012	0.0181
NPL	0.295981	0.282647	1.047174	0.2960
LDR	0.028693	0.011755	2.440952	0.0153
INF	0.740878	0.331821	2.232762	0.0264
NPLINF	-0.096092	0.085564	-1.123049	0.2625
LDRINF	-0.004772	0.003476	-1.372863	0.1710

Effects Specification				
Cross-section fixed (dummy variables)				
Root MSE	1.984501	R-squared		0.587866
Mean dependent var	0.823023	Adjusted R-squared		0.511303
S.D. dependent var	3.096382	S.E. of regression		2.164584
Akaike info criterion	4.527549	Sum squared resid		1185.412
Schwarz criterion	5.118717	Log likelihood		-633.3962
Hannan-Quinn criter.	4.764109	F-statistic		7.678241
Durbin-Watson stat	1.844482	Prob(F-statistic)		0.000000

Based on Table 5, the moderation regression analysis (MRA) investigating the role of inflation in moderating the impact of Non-Performing Loans (NPLs) on profitability found that the inflation variable has a regression coefficient of -0.096092. The significance level of the inflation variable is 0.2625, which exceeds 0.05 (0.2625 > 0.05). Therefore, it can be concluded that inflation does not significantly moderate the relationship between Non-Performing Loans and profitability. Consequently, hypothesis H<sub>3</sub> in this study is rejected.

These results suggest that while inflation may cause economic instability and affect people's ability to repay loans, other factors may have a greater influence on the relationship between NPLs and bank profitability. The insignificance of inflation moderation can be caused by several factors such as effective risk management, other macroeconomic conditions, or monetary and regulatory policies that are not discussed in this study. The results of this study are in line with research conducted Handayani et al., (2024) and Wandisyah & Hutagalung, (2019) which state that inflation is unable to moderate the effect of non-performing loans on return on assets.

Based on the moderation regression analysis (MRA) testing the effect of inflation in

moderating the impact of Loan to Deposit Ratio on profitability, it was found that the inflation variable has a regression coefficient of -0.004772. The significance level of the inflation variable is 0.1710, which is greater than 0.05 ( $0.1710 > 0.05$ ). Therefore, it can be concluded that inflation does not significantly moderate the relationship between Loan to Deposit Ratio and profitability. Hence, hypothesis  $H_4$  in this study is rejected.

Inflation can influence bank investment decisions and overall economic stability, but other factors seem to have a greater impact on the relationship between LDR and profitability. These results suggest that the influence of inflation on bank profitability through LDR may not be as strong as hypothesized by Keynesian theory, and other factors not analyzed in this study may be more relevant in determining bank profitability. The results of this study are confirmed by the research of Handayani et al., (2024) which states that inflation is unable to moderate the loan to deposit ratio on return on assets.

## CONCLUSION

Non-Performing Loans (NPL) has a negative influence on Return on Assets (ROA), but is not statistically significant. This shows that although an increase in NPLs can reduce bank profitability, the effect is not significant, which contradicts the bad management hypothesis which states that high NPLs are caused by incompetent bank management and can reduce bank profitability. Loan to Deposit Ratio (LDR) has a positive and significant effect on ROA, meaning that the higher the LDR, the greater the bank's profitability, which is consistent with the Anticipated Income theory which states that greater credit allocation can increase the bank's earning potential. Inflation has no significant moderating effect on the relationship between NPL and ROA or the relationship between LDR and ROA, indicating that although inflation can affect economic conditions and bank investment decisions, its effect on bank profitability through NPL and LDR is not significant.

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