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NPL Effect Moderating LDR, Profitability & CAR on Profitability of Indonesian Private Banks

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Abstract.
Banks, as central entities within the economic sphere, are responsible for maintaining stability and integration, one aspect of which is preserving profitability. A common measure for evaluating a bank's performance in generating profits through operational activities, which plays a crucial role in this context. This study aims to investigate the extent to which the loan-to-deposit ratio (LDR), profitability, and capital adequacy ratio (CAR) impacts the return on assets (ROA), with non-performing loans (NPL) serving as a moderating variable. By employing quantitative methods, this research analyzes processed data from the company's financial reports. The study period spans from 2015 to 2020, a time during which ROA, NPL, operating expense to operating income (BOPO), net interest margin (NIM), and CAR experienced fluctuations in conventional banks, leading to a research gap. The rationale behind this investigation stems from these observed fluctuations. This study focuses on all commercial banks supervised by the financial services authority (OJK), using a sample of 15 national private banks as the population. Data analysis techniques encompass descriptive analysis, partial least squares (PLS), and hypothesis testing. The findings reveal that CAR and LDR do not have a significant impact on ROA. In contrast, NIM and BOPO exert a considerable influence on ROA. However, no substantial effect was observed in the NPL interaction, which moderates the relationship between LDR, BOPO, NIM, and CAR on ROA.

Keywords: loan deposit ratio, profitability, capital adequacy ratio, return on assets, non-performing loans

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1. Introduction

The banking sector plays a crucial role in influencing domestic economic development and maintaining the stability and integrity of an economy. Banks primarily act as intermediaries between customers facing financial challenges and those with surplus assets, fostering a reciprocal relationship between them (Apriadi et al., 2017). A country's progress can be assessed by examining its banking system, as all sectors conduct their financial activities utilizing banking services. The primary functions of banks include channeling and collecting funds from the community and providing other banking services (Setiawan & Pratama, 2019).

Bank sustainability relies on performance and profitability, with the latter often measured by the return on assets (ROA) ratio (Hendrawan & Lestari, 2016; Pinasti & Mustikawati, 2018). ROA compares net income to total assets, enabling the evaluation of a company's performance. Various factors can influence bank profitability, including non-performing loans (NPLs), which arise from phenomena such as falling commodity prices and weakening exchange rates (Gita Rossiana, 2018) or government policies like credit restructuring during pandemics (Septiadi, 2020). While Aliu and Çollaku (2021) argue that an increase in NPLs leads to a decrease in ROA, other studies (Septiani & Lestari, 2016; Pinasti & Mustikawati, 2018; Buchory, 2015; Harun, 2016) suggest that NPLs do not significantly impact ROA. NPLs are employed as a moderating variable in this study, as suggested by Ali et al. (2019), who found that credit quality can act as a moderating variable in measuring company performance.

Bank profitability is also affected by interest income from loans, with greater loan distribution leading to higher profits. The loan-to-deposit ratio (LDR) is used to determine the amount of funds to be credited to third parties. A higher LDR value indicates greater profitability for the bank. Rengasamy (2014) found a positive relationship between LDR and ROA, while Pinasti and Mustikawati (2018) reported no significant negative effect of LDR on ROA. Furthermore, banks must manage their operational costs in relation to operational income (BOPO) to maintain profitability. BOPO serves as an indicator of a bank's efficiency in managing operating expenses relative to operating income. An increase in BOPO results in a decrease in ROA, as demonstrated by Ningsih et al. (2017) and Sinung et al. (2016).

In addition to considering BOPO, banks should also monitor the net interest margin (NIM) ratio, which measures net interest income on profitable assets. A higher NIM contributes to increased profits and enhanced bank performance (Avrita & Pangestuti, 2016). Hayati and Musdholifah (2014) found a positive and significant relationship between NIM and ROA, while Avrita and Pangestuti (2016) reported no significant positive effect. To maintain profitability, banks must also pay attention to their capital adequacy using the capital adequacy ratio (CAR), which measures the extent to which bank assets can be financed by their own capital (Asmi, 2014). A higher CAR strengthens bank capital, positively influencing profitability. Suardita and Putri (2015) found a positive and significant relationship between CAR and ROA, while Putrianingsih and Yulianto (2016) reported no significant effect.

2. Literature Review

2.1. Loan Deposit Ratio (LDR) Mempengaruhi Return on Asset (ROA)

The Loan-to-Deposit Ratio (LDR) is a metric used to assess a bank's capacity to extend credit, taking into account customer funds and the bank's own capital (Kasmir, 2016). As outlined in the Bank Indonesia Circular Letter Number 6/23/DPNP (2004) concerning the Rating System for Commercial Banks, a fair LDR value falls within the 75% to 100% range, with values of 75% or lower considered healthy. A higher LDR can positively impact a bank's profits (Pinasti & Mustikawati, 2018), as a greater ratio enables increased profitability through more efficient loan disbursement and better management of third-party funds. Profit from loan interest is directly related to the volume of credit activity (Purnamawati, 2014; Buchory, 2015). Given this context, the first hypothesis of this study is as follows:

Hypothesis 1: A positive and significant relationship exists between Loan-to-Deposit Ratio (LDR) and Return on Assets (ROA).

The Bank Operating Efficiency Ratio (BOPO) evaluates a bank's effectiveness in carrying out its functional activities by comparing operating expenses to operating income (Rivai et al., 2007). The efficiency and capability of a bank in conducting its functional activities can be measured through the BOPO ratio (Kusumastuti & Alam, 2019). Banks need to effectively manage inputs to maximize output, ensuring careful internal management to mitigate operational risks (Ismaulina & Zulfadhli, 2016). The Central Bank recommends a BOPO ratio below 90%; a ratio exceeding 90% indicates inefficiency in operational activities (Pradnyawati & Widhiastuti, 2020). An increase in the BOPO ratio leads to a decrease in ROA. Empirical evidence demonstrates a negative and strong relationship between BOPO and ROA (Kusumastuti & Alam, 2019; Rusmini & Adiandari, 2020). Based on this explanation, the second hypothesis of this study is:

Hypothesis 2: Bank Operating Efficiency Ratio (BOPO) has a negative and significant impact on Return on Assets (ROA).

The Net Interest Margin (NIM) evaluates the proportion of net interest income relative to total productive assets (Cand & Taswan, 2010). NIM, often considered a market risk, can be influenced by interest rate factors determined by the difference between the refinancing interest rate and the loan interest rate (Sondakh et al., 2021). Bank Indonesia establishes a benchmark NIM of 5% (Bank Indonesia Regulation Number 13/1/PBI/2011, 2011). A higher NIM value contributes to increased profit, as a larger net interest income implies that the bank can effectively manage its productive assets to generate income. Banks must maintain and enhance net interest income as a source of profit. Previous

studies (Karamoy & Tulung, 2020; Sondakh et al., 2021) have concluded that NIM positively influences ROA. In light of this, the third hypothesis is:

Hypothesis 3: Net Interest Margin (NIM) has a positive and significant impact on Return on Assets (ROA).

The Impact of Capital Adequacy Ratio (CAR) on Return on Assets (ROA)

Apart from augmenting third-party funds, the Capital Adequacy Ratio (CAR) serves as a crucial metric in evaluating an entity's financial capacity, encompassing the risk involved in raising equity capital (Dendawijaya, 2009). A high CAR signifies that a bank is proficient in managing its capital and allocating it effectively across its operations, which serves as an indicator of competent bank management. A large CAR value implies a greater likelihood of generating profits (VMS et al., 2020). The minimum regulatory capital requirement is set at $\geq$ 8%, with a minimum core capital ratio of 6% and a minimum primary core capital of 4.5% of Risk-Weighted Assets (RWA). A higher CAR enables a company to allocate its capital more freely towards profit-generating funding and investment activities, thus influencing ROA growth. Previous research by VMS et al. (2020) and Pratama (2021) has established a positive relationship between CAR and ROA. Based on the aforementioned information, the fourth hypothesis is:

Hypothesis 4: Capital Adequacy Ratio (CAR) has a significant positive impact on Return on Assets (ROA).

The Influence of Loan Deposit Ratio (LDR) on Return on Assets (ROA) Moderated by Non-Performing Loans (NPL)

Non-Performing Loans (NPL) represent problematic loans and serve as a ratio to assess a bank's risk coverage capability in case of debtor default by comparing the volume of problematic loans to the total loans granted (Kasmir, 2016). A loan is deemed problematic if the debtor fails to make payments for 90 days or more (Jing, 2020). NPLs can stem from risks during credit distribution, including the occurrence of default. The presence of default in credit distribution influences profitability. An increase in loan distribution may consequently lead to a higher volume of bad loans, adversely affecting profits. This is consistent with research by Suardita & Putri (2015), which demonstrates a negative and significant impact of risky loans on the interaction between lending and profitability. Based on this information, the fifth hypothesis is:

Hypothesis 5: Non-Performing Loans (NPL) can moderate the effect of Loan Deposit Ratio (LDR) on Return on Assets (ROA).

The Impact of Operating Expenses to Operating Income (BOPO) on Return on Assets (ROA) Moderated by Non-Performing Loans (NPL)

Operating Expenses to Operating Income (BOPO) is a ratio used to gauge a bank's effectiveness in executing its functional activities by comparing operating expenses with operating income. Operating income is influenced by operational activities, such as loan interest, while operating expenses are affected by the level of non-performing loans. The BOPO ratio can be influenced by the volume of non-performing loans. An increase in non-performing loans can lead to a rise in operating expenses and a reduction in operating income. If operating expenses increase and operating income decreases, the BOPO ratio will rise, subsequently affecting the decline in profitability. This is in agreement with research by Muchtar et al. (2021), which found that the NPF value has a negative and significant influence on the interaction between BOPO and profitability, with NPF amplifying the effect of BOPO on profitability. In light of the above explanation, the sixth hypothesis is:

Hypothesis 6: Non-Performing Loans (NPL) can moderate the effect of Operating Expenses to Operating Income (BOPO) on Return on Assets (ROA).

The Impact of Net Interest Margin (NIM) on Return on Assets (ROA) with Non-Performing Loans (NPL) as a Moderating Factor

Net Interest Margin (NIM) is a key metric used to evaluate the net interest income generated from productive assets. One such productive asset for banks is the utilization of earning assets in lending activities. When lending occurs, it is accompanied by loan risks, which can lead to problematic loans. Non-performing loans (NPL) can influence the acquisition of net interest income, ultimately affecting a bank's profitability. A higher prevalence of non-performing loans can result in decreased net interest income, subsequently lowering profitability. Empirical evidence suggests that NPL significantly impacts the relationship between NIM and ROA, thereby moderating the interaction between NIM and ROA (Fitriyani, 2018). Based on this explanation, the seventh hypothesis is proposed:

Hypothesis 7: Non-Performing Loans (NPL) can moderate the effect of Net Interest Margin (NIM) on Return on Assets (ROA).

The Influence of Capital Adequacy Ratio (CAR) on Return on Assets (ROA) with Non-Performing Loans (NPL) as a Moderating Factor

Capital Adequacy Ratio (CAR) is an essential metric for determining a bank's ability to fulfill its financial obligations at risk by utilizing its own capital. A high CAR value is indicative of a bank's increased potential to generate profits (VMS et al., 2020). A higher CAR ratio demonstrates that the bank can manage its capital efficiently. The CAR value can be derived by comparing a bank's capital to its Risk-Weighted Assets (RWA), which consist of credit risk, market risk, and operational risk. Consequently, a high credit risk

at a bank will impact its capital levels, as a portion of the bank's capital will be allocated to meet risky obligations in the form of non-performing loans. An elevated credit risk (NPL) will affect the CAR, ultimately impacting profitability because the bank's capital, which should be efficiently managed to generate profits, is diminished. Consistent with previous research (Tri Rinawati, 2019), the NPL value has a positive and significant effect on moderating the relationship between CAR and ROA, implying that NPL reinforces the interaction between CAR and ROA. Based on this explanation, the eighth hypothesis is proposed:

Hypothesis 8: Non-Performing Loans (NPL) can moderate the effect of Capital Adequacy Ratio (CAR) on Return on Assets (ROA).

3. Method

3.1. From the results of the previous assumptions and hypotheses presented, there is a research design as follows:

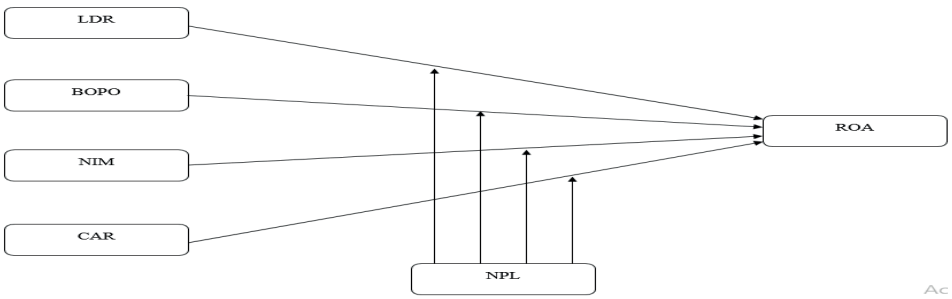

Figure 1: Research Design.

The research design presented was an operational design, employed as an alternative to an explanatory approach cited from a book (UM, 2017). The study utilized four independent variables: LDR, BOPO, NIM, and CAR. The dependent variable was ROA, moderated by NPL. This study employed a descriptive quantitative approach to ascertain the relationships between variables and the extent to which LDR, profitability, and CAR influenced ROA, with NPL serving as a moderator in conventional banks. The data utilized in this research were secondary data obtained from financial reports of conventional commercial banks registered with the OJK from 2015 to 2020. The population for this study comprised all conventional banks registered with the OJK between 2015 and 2020, while the sample consisted of 15 National Private Banks registered with the OJK. The purposive sampling method was employed to select samples, considering specific characteristics.

Data collection techniques were conducted through documentation, which encompassed records of significant events in the form of images, works, or writings by an individual (Sugiyono, 2013). Documentation was utilized to acquire secondary data, such as financial statements of conventional banks registered with the OJK from 2015 to 2020, which served as the basis for calculations. This data was gathered from the official OJK website, IDX official website, and the websites of individual companies. The analytical technique employed in the research was descriptive analysis, which displayed the obtained data sets (Sugiyono, 2017). This research utilized the SmartPLS measurement tool. PLS is a variance-based systematic function that can display latent variables measured using indicators (Ghozali, 2013). PLS contains two models: the Outer Model and the Inner Model. The Outer Model includes discriminant validity, convergent validity, composite reliability, and multicollinearity tests, while the Inner Model encompasses the coefficient of determination test and the effect size test.

4. Results And Discussion

4.1. Results

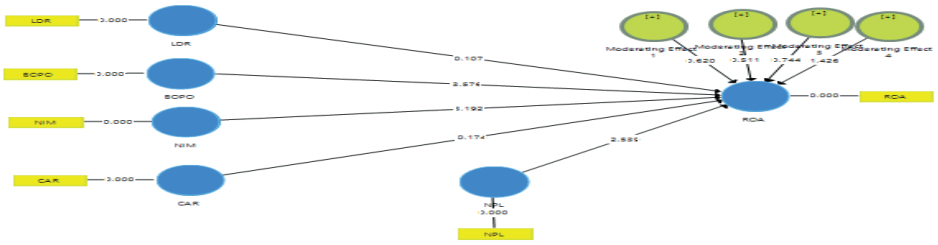

Figure 2: Structural Model.

The results from hypothesis testing using the bootstrapping method provide evidence for the interaction between independent and dependent variables in this study. Table 1 presents the outcomes of hypothesis testing through bootstrapping, based on the data analyzed. From Table 1, it can be observed that the association between BOPO and ROA yields a positive coefficient of 0.367, accompanied by a statistically significant p-value and t-statistic of 0.000 and 3.576, respectively. Similarly, the relationship between CAR and ROA exhibits a positive coefficient of 0.020, with a p-value and t-statistic of 0.862 and 0.174, respectively.

Conversely, the LDR's association with ROA demonstrates a negative coefficient of -0.007, with a corresponding p-value and t-statistic of 0.915 and 0.107. Additionally, the correlation between NIM and ROA displays a positive coefficient of 0.265, along

with a statistically significant p-value and t-statistic of 0.002 and 3.192. The connection between NPL and ROA reveals a negative coefficient of -0.275, supported by a significant p-value and t-statistic of 0.011 and 2.539.

In terms of the moderating variable, the interaction between LDR and ROA, moderated by NPL, exhibits a negative coefficient of -0.050, with a p-value and t-statistic of 0.536 and 0.620. Meanwhile, the interaction between BOPO and ROA, moderated by NPL, shows a positive coefficient of 0.048, along with a p-value and t-statistic of 0.610 and 0.511. Furthermore, the interaction between NIM and ROA, moderated by NPL, yields a negative coefficient of -0.104, with a p-value and t-statistic of 0.457 and 0.744. Lastly, the interaction between CAR and ROA, moderated by NPL, displays a positive coefficient of 0.337, accompanied by a p-value and t-statistic of 0.155 and 1.426.

Table 1: Hypothesis Testing (Bootstrapping).

	Original Sample	Simple Mean	Standart Deviasi	T Statistics	P Values
BOPO -> ROA	0,367	0,358	0,103	3,576	0,000
CAR -> ROA	0,020	0,033	0,117	0,174	0,862
LDR -> ROA	-0,007	0,003	0,063	0,107	0,915
LDR*NPL -> ROA	-0,050	-0,042	0,081	0,620	0,536
BOPO*NPL -> ROA	0,048	0,059	0,094	0,511	0,610
NIM*NPL -> ROA	-0,104	-0,082	0,140	0,744	0,457
CAR*NPL -> ROA	0,337	0,241	0,237	1,426	0,155
NIM -> ROA	0,265	0,242	0,083	3,192	0,002
NPL -> ROA	-0,275	-0,304	0,108	2,539	0,011

5. Discussion

The association between the Loan-to-Deposit Ratio (LDR) and Return on Assets (ROA) was examined, resulting in the rejection of the first hypothesis. It was concluded that LDR does not significantly influence ROA, suggesting that an increase in LDR does not necessarily lead to an increase in ROA. This lack of impact could be attributed to the high mean LDR value within the fairly healthy category. As LDR values rise, so do the associated risks. Therefore, LDR is not a key determinant of ROA; rather, other factors such as high credit risk and government policies play a more significant role. Banks aim not only to maximize profits but also to ensure sustainability by maintaining their soundness. This study's findings are supported by Gomez-Biscarri et al. (2021) and Jin et al. (2021), who found that high credit provision can adversely affect net worth due to the potential for increased credit risk. Additionally, the results align with Pandoyo &

Samsudin's (2020) findings, which also reported no significant effect of LDR on ROA. However, these findings contrast with those of Pinasti & Mustikawati (2018) and Buchory (2015), who found that higher LDR values contribute to increased ROA. High LDR can lead to bank load efficiency issues when high credit risk emerges.

The relationship between the Bank Operating Profitability to Operating Expense Ratio (BOPO) and ROA was also investigated, with the second hypothesis being accepted. This indicates that BOPO positively and significantly affects ROA. A significant positive impact on ROA stems from the expansion of conventional banks' businesses, aiming to target markets capable of generating substantial profits. This study's findings are consistent with those of Ismail et al. (2013), who explained that banks have significant opportunities for growth by enhancing load efficiency through resource allocation and effective utilization. A bank's sustainability is demonstrated by its ability to operate with low inefficiency while temporarily increasing efficiency costs (Badunenko et al., 2021). These results are in line with Khoirunnisa et al. (2016), who found that the Capital Adequacy Ratio (CAR), LDR, and BOPO all have a significant positive effect on ROA. However, this study differs from other findings that suggest high BOPO values negatively impact ROA, as higher expenses can result in reduced loan interest income (Bawa & Basu, 2020).

The analysis of the relationship between the Net Interest Margin (NIM) and ROA led to the acceptance of the third hypothesis, concluding that NIM has a positive and significant effect on ROA. The growth in NIM for conventional banks is attributed to increased credit demand, which tends to raise lending rates and, consequently, bank profits. This assertion is supported by Tarus et al. (2012), who argued that high-interest rate spreads are aimed at improving margin efficiency. The study's results are consistent with those of Karamoy & Tulung (2020) and Sondakh et al. (2021), who also found that an increase in NIM positively affects bank profitability and that NIM has a significant positive impact on ROA, respectively.

Lastly, the examination of the relationship between CAR and ROA resulted in the rejection of the fourth hypothesis, concluding that CAR does not significantly affect ROA. CAR's lack of significant impact on ROA can be attributed to the high average CAR, which exceeds the limit set by Bank Indonesia. This suggests that banks do not utilize their capital efficiently, increasing the burden on banks from their own capital. Moreover, CAR does not affect ROA because, like with LDR, banks prioritize maintaining their sustainability and soundness over solely pursuing high profits.

The association between Loan-to-Deposit Ratio (LDR) and Return on Assets (ROA), moderated by Non-Performing Loans (NPL), suggests that the fifth hypothesis is not

supported, concluding that the interaction of LDR and NPL as a moderating variable does not impact ROA. This observation arises when banks exercise caution in extending credit, reducing the risk of bad credit and leaving ROA unaffected. This study aligns with the findings of Sari et al. (2019), which demonstrated that NPL could not moderate the relationship between LDR and ROA. However, it diverges from the conclusions of Suardita & Putri (2015), which indicated a significant influence of credit risk as a moderator of LDR on ROA, and the theories presented by Bhowmik & Sarker (2021) and Naili & Lahrichi (2022), which suggested that credit growth contributes to a decline in ROA due to increased bad loans.

The relationship between Operating Expense to Operating Income Ratio (BOPO) and ROA, moderated by NPL, implies that the sixth hypothesis is not supported, concluding that the interaction between BOPO and ROA is not affected by NPL. The growth of third-party funds, which contributes to high BOPO, results in increased liquidity that influences profitability. Banks maintaining efficiency levels tend to avoid risks that may lead to additional costs, such as lending risks (Iosifidi et al., 2021). This study's findings are consistent with Ariani et al. (2020), which discovered that NPL did not significantly affect the relationship between BOPO and ROA. However, the results contrast with Muchtar et al. (2021), which demonstrated a significant negative effect on profitability due to the interaction between BOPO and Non-Performing Financing (NPF).

The association between Net Interest Margin (NIM) and ROA, moderated by NPL, indicates that the seventh hypothesis is not supported, concluding that the interaction between NIM and NPL as a moderating variable does not influence ROA. Nevertheless, as Saksonova (2014) noted, NIM tends to decline before difficulties arise, while ROA remains stable. The downward trend in NIM may demonstrate considerable efficiency in resource allocation. Factors such as increased competition, technological advancements that enhance productivity, and low interest rates may increase risk-taking, affecting the reduction of NIM on ROA (Claessens et al., 2017). Consequently, NPL is not a contributing factor in the influence of NIM on ROA. This research concurs with Astohar (2014), which found that NPL does not moderate the relationship between NIM and ROA, as other factors could weaken or strengthen these connections. This outcome differs from Fitriyani's (2018) findings, which proposed that NPF could moderate the interaction between Net Operating Margin (NOM) and ROA.

The association between Capital Adequacy Ratio (CAR) and Return on Assets (ROA) is not influenced by the presence of Non-Performing Loans (NPL), leading to the rejection of the eighth hypothesis. It is concluded that the interplay between CAR and NPL, acting as a moderating factor on ROA, does not yield a significant effect. The implementation

of capital adequacy requirements is found to impact higher loan interest rates, which in turn influences profitability (Kabir Hassan et al., 2016). This study aligns with the findings of Anggawulan and Suardikha (2021), who discovered that credit risk fails to moderate the influence of capital adequacy on profitability. However, this research contrasts with the results presented by Tri Rinawati (2019), who argued that NPL can indeed moderate the relationship between CAR and ROA. Elevated CAR levels prompt banks to augment credit and asset growth.

6. Conclusions

This study aims to investigate the influence of the Loan Deposit Ratio (LDR), Operating Income to Operating Expenses (BOPO), Net Interest Margin (NIM), and Capital Adequacy Ratio (CAR) on Return on Assets (ROA) in conventional banks. Additionally, the research examines the moderating role of Non-Performing Loans (NPL) on the relationship between LDR, BOPO, NIM, and CAR on ROA. The findings reveal that LDR does not significantly impact ROA, indicating that while higher credit provision may potentially increase credit risk and decrease net worth, the effect is insignificant as the average LDR remains within a healthy range. Conversely, BOPO and NIM positively affect ROA, suggesting that banks can enhance their growth prospects by improving operational efficiency through resource allocation and utilization. Furthermore, higher net interest income contributes to improved margin efficiency. CAR, however, does not influence ROA, as the positive effect of a higher capital ratio on business diversification and profitability is offset by the average CAR exceeding regulatory limits. The moderating role of NPL on the relationship between LDR, BOPO, NIM, and CAR is found to be insignificant, as it neither weakens nor strengthens the relationship. This is due to the average NPL value remaining within acceptable limits, allowing conventional banks to manage non-performing loan risks effectively. This study's limitations include the use of financial ratio proxies as independent variables and a limited sample size. Future research is encouraged to expand the range of independent, dependent, and moderating variables, as well as increase the sample size of foreign exchange private banks to provide more comprehensive results and clearer insights into profitability levels. It is also recommended that future studies explore alternative moderating variables, given the inconclusive findings of the current study. Researchers could also consider using firm value as the dependent variable and ROA as a moderating variable. Lastly, this study does not account for the inverted U-shaped effect, where a high BOPO value positively impacts ROA, suggesting that increased BOPO may lead to higher ROA.

Future research should consider the influence of the inverted U-shaped effect on the relationship between BOPO and ROA.

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