Eduvest – Journal of Universal Studies
Volume 6 Number 1, January, 2026
p- ISSN 2775-3735- e-ISSN 2775-3727

The Effect of Credit Risk on Profitability of Indonesian State-Owned Commercial Banks: The Intervening Role of Operating Efficiency

Chezia Rauly Simatupang[1], Muslimin[2], Muhammad Yunus Kasim[3], Fera[4]
Universitas Tadulako, Indonesia.
Email: cheziarauly21@gmail.com, hasan.muslimin66@gmail.com, yunuskasim77@yahoo.com, fera@untad.ac.id

ABSTRACT

This research explores the influence of credit risk, specifically non-performing loans (NPL), on the profitability of Indonesian state-owned commercial banks, using operational efficiency as an intervening variable. State-owned banks in Indonesia play a significant role in supporting the national economy through credit distribution, particularly to small and medium-sized enterprises (SMEs). However, rising NPL ratios present a critical challenge, impacting financial stability and profitability. The study investigates how NPLs, as a proxy for credit risk, affect profitability, with operational efficiency—measured by the operating expenses to operating income (OEOI) ratio—acting as a mediator. Using data from four state-owned banks over the period 2015–2024, the research applies path analysis and mediation tests to examine direct and indirect relationships. The findings reveal that NPL positively affects operating efficiency, which in turn negatively affects profitability (return on assets—ROA). Furthermore, operational efficiency significantly mediates the correlation between NPL and profitability. These outcomes suggest that improving operational efficiency can help diminish the negative influences of high credit risk. By integrating risk control mechanisms with operational efficiency, state-owned banks can ensure long-term profitability. This study provides practical insights for bank management in strengthening sustainable banking operations in an emerging economy.

KEYWORDS Credit Risk, Operating Efficiency, Profitability, State-Owned Bank.

INTRODUCTION

The banking industry takes a crucial part in a developing country as it distributes funds to promote economic growth and stability. In general, the banking industry gradually facilitates investments and consumption that drive the economic activity in a country. A healthy and well-functioning banking system can enhance financial inclusion, support Small and Medium Enterprises (SMEs), and raise infrastructure development, all essential for economic growth in developing countries (A. Maulana et al., 2024).

Especially in Indonesia, the state-owned bank's role is stronger than private banks due to the low level of public trust in most private banks (Darman, 2021). State-owned banks take a more significant part in supporting local economies by supplying credits and training program to SMEs (Small and Medium Enterprises. According to OJK (Financial Services Authority), state-owned banks recorded the highest credit growth among all bank ownership types at 8.30% year-on-year as of August 2023, highlighting their dominant role in credit distribution (Aprilia, 2023).

Despite the significant impact that state-owned banks can have on the country's economy, the banking industry is always paired with the risks of uncertainties conditions and changes (Suwedy et al., 2022). In this context, various types of risks exist, including market risk, credit

risk, and operational risk. Among these, credit risk is particularly critical because it directly affects the financial stability of banks. Credit risk theory explains the potential for loss due to a borrower's failure to repay a loan or meet contractual obligations (Beker, 2023). The NPL is a proxy for banking industry credit risk (Mirović et al., 2024). When borrowers can not fulfill their payment obligations, the bank loss of expected interest income and has to cover extra costs. This goes against the ideal situation where banks expect the money they lend to be paid back in full and on time, as stated in the credit agreement (Hasmiana et al., 2022) (Husnah et al., 2023).

As of April 2024, the gross NPL ratio across all types of banks in Indonesia increased from 2.19% in December 2023 to 2.33%. Although these numbers remain below the Bank Indonesia regulatory threshold of 5%, they highlight a growing challenge that could impact the financial health of banks, particularly state-owned institutions (Arrijal Rachman, 2024). A higher NPL ratio signals greater concern for the bank's financial health (Kadang et al., 2018). The rising of NPL number underscore the urgent need for effective credit risk management strategies within these banks (Brik, 2024; Figueiredo, 2023).

The banks profits are negatively affected by the rise in non-performing loan (NPL). Banks must set aside a certain amount of money to cover these bad loans. When there are many non-performing loans, the money set aside reduces the bank's income and increases operating expenses, which lowers their profitability. This increased company value is especially beneficial for banks, as it enables them to attract more funds, which is crucial for expanding their ability to provide credit.

Profitability is a central point of how effectively a bank's management can generate profits (Kasmir & Gill, 2018; Mustopa et al., 2021). The most widely used measure for profitability is the Return on Assets (ROA), which show how a bank utilizes its holdings to make profits efficiently. According to Wahyuningsih and Gunawan (2017), ROA is measured by comparing a bank's net profit after tax to its entire assets, expressed as a percentage.

Improving operating efficiency is essential for sustaining profitability in the banking industry, which constantly faces risks from uncertain conditions and rapid changes (Suwedy et al., 2022). This efficiency drives innovation, helping banks adapt and thrive in the dynamic economic activity. A study by Nurfitria et al., 2023 found that rising NPL ratios significantly reduce ROA in Indonesian banks. This emphasizes the substance of strong credit risk management operation to lessen these negative effects. Another study by Swandewi and Purnawati (2021) proved that NPL has a negative correlation with profitability, affecting profitability significantly.

Operating efficiency, commonly calculated through the ratio of operating expenses to operating income (OEOI), has emerged as a critical factor in understanding the NPL and profitability relationship (Eviyanti et al., 2018). The OEOI ratio compares a bank's operational expenses to its operational income (Risendy & Samudra, 2022). Since banks act as intermediaries that collect and distribute public funds, their operational expenses and income are mostly made up of interest expenses and interest income (Hutagalung et al., 2020). Bank with a higher percentage of NPL often find themselves unable to manage operational efficiency due to problematic category loans that require additional resources to handle, which will increase expenses.

Previous studies have examined the relationship between credit risk, operational efficiency, and bank profitability in various contexts, yet the findings remain inconsistent. Hasmiana et al., (2022) using a sample of national private and state-owned commercial banks in Indonesia, found that operational efficiency did not significantly mediate the effect of Non-Performing Loans (NPL) on profitability (ROA). In contrast, Eviyanti et al., (2018) stated that operational efficiency (OEOI) give negative and significant effect on intervening NPL on profitability. The research being tested by 18 banks including in Commercial bank stated in business activities 3 in the term in 2013 – 2015.

Despite these contributions, prior research has several limitations. Most studies employed mixed samples of different bank types, rather than specifically examining Indonesian state-owned commercial banks. Moreover, earlier studies were conducted in relatively stable economic periods and did not capture the structural changes in credit risk conditions following the COVID-19 pandemic. Since 2020, rising NPL levels and shifting economic conditions have significantly altered the risk profile of the banking sector, making it essential to reassess the relationship between credit risk, operational efficiency, and profitability using more recent data. This study therefore focuses on Indonesian state-owned commercial banks over the 2015–2024 period to provide updated and context-specific evidence. By examining how operational efficiency mediates the impact of NPL on profitability, this research offers practical insights into how state-owned banks can strengthen credit risk management while sustaining financial performance.

RESEARCH METHOD

This research focuses on 4 state-owned commercial banks listed in the Bank Indonesia directory and the Indonesia Stock Exchange (IDX): Bank Mandiri, Bank Negara Indonesia (BNI), Bank Tabungan Negara (BTN), and Bank Rakyat Indonesia (BRI). All four banks were included using a census approach. The study uses quantitative secondary data in the form of time series covering the period 2015–2024, collected from the banks' annual financial reports. The research focuses on NPL as the independent variable, ROA as the measure of profitability, and the OEOI as the mediating variable, resulting in 40 observations. Data were analyzed with SPSS AMOS through descriptive statistics, classical assumption testing, and path analysis. The Sobel test was used to confirm the mediating effect of OEOI. This approach allows for a clear assessment of both direct and indirect correlations between credit risk, operational efficiency, and profitability.

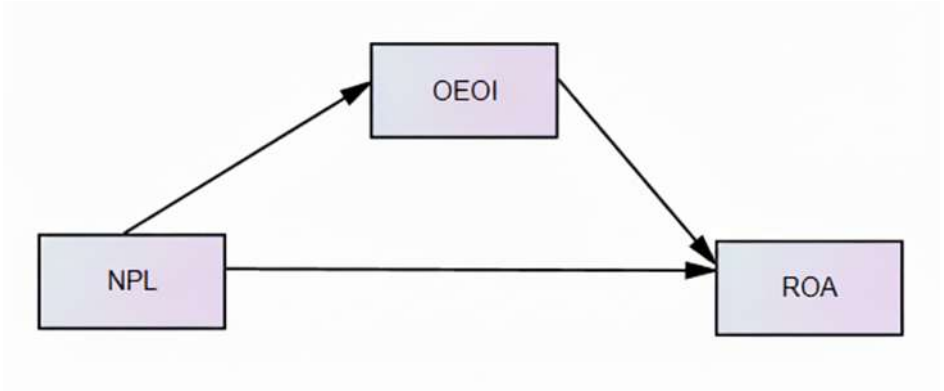

Figure 1. Conceptual Framework

1. H_1 = NPL has a significant and negative influence on profitability.
2. H_2 = NPL has a significant and positive influence on operating efficiency.
3. H_3 = Operating efficiency has a significant and negative influence on profitability.
4. H_4 = NPL has a significant and negative influence on profitability with operating efficiency as intervening variable.

RESULT AND DISCUSSION

Descriptive Analysis

Descriptive analysis was conducted to present an outline of the data based on the maximum and minimum value, standard deviation, and mean. The descriptive statistics (Table 1) displays the variables NPL, OEOI, and ROA.

Table 1. Descriptive Statistic

Variable	Minimum	Maximum	Mean	Std. Deviation
NPL	0.97	4.78	2.7975	0.814
OEOI	51.88	98.12	74.6258	10.4707
ROA	0.13	4.19	2.4458	1.1069

Based on Table 1, the maximum value of NPL is 4.78 and the minimum is 0.97, with a standard deviation of 0.814 and a mean of 2.7975. It can be concluded that the credit risk in the four banks is moderate and relatively stable over the period. The minimum value of OEOI is 51.88 and the maximum is 98.12, with a standard deviation of 10.4707 and a mean of 74.6258. The wide range of OEOI can be interpreted as indicating that among the four state-owned banks, some operate near best practice efficiency, while others operate with expenses nearly equal to income, which leads to structural inefficiencies that can strongly depress ROA. The maximum value of ROA is 4.19 and the minimum is 0.13, with a standard deviation of 1.1069 and a mean of 2.4458. This number implies that overall the state-owned banks are still reasonably profitable. However, the profit levels vary significantly between bank and across years. This can be reinforcing the relevance of modeling how NPL and OEOI effectively explain this variability. In brief, the numbers show moderate and stable NPL, but large differences in efficiency and profitability suggesting that operational efficiency plays a crucial role in explaining why similar banks generate different profit levels.

Multivariate Normality Test

A multivariate normality test was carried on. The outcomes of this test are presented in Table 2.

Table 2. Multivariate Normality Test

Assessment of Normality (Group number 1)

Variable	Min.	Max.	Skew.	C.R.	Kurtosis	C.R.
NPL	.970	4,780	,145	,375	,285	,368
OEOI	51,880	98,120	,202	,521	-,421	-,543
ROA	,130	4,190	-,304	-,785	-,941	-1,215
Multivariate					-1,058	-,611

Based on Table 2, the critical ratio (C.R.) value in the multivariate row is -0.611. Since the critical ratio falls within the acceptable range of ±2.58, specifically between -2.58 and 2.58, it can be concluded that the assumption of multivariate normality is satisfied. In brief, the results suggest that both univariate and multivariate normality assumptions are reasonably met. As the data are normally distributed and free from extreme outliers, standard statistical tests can be appropriately applied, and the estimated relationships among NPL, OEOI, and ROA can be considered reliable.

Hypothesis Test

Hypothesis testing was conducted using SPSS AMOS based on the figure presented in Figure 2 below.

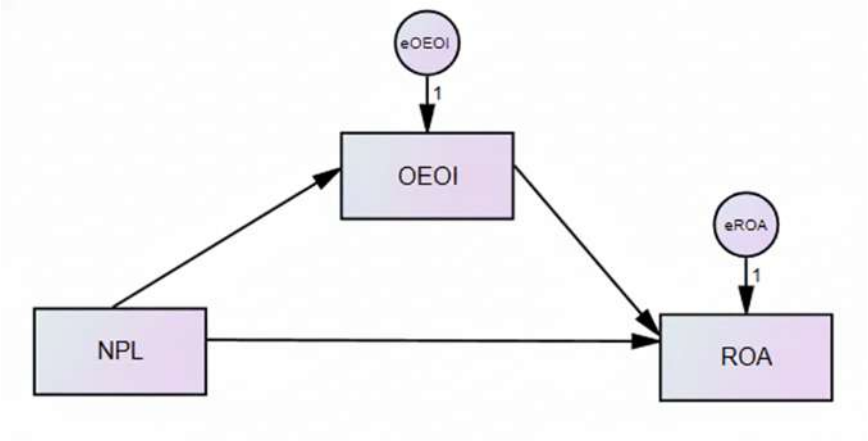

Figure 2. Path model of the relationship between NPL, OEOI, and ROA

The test was run to examine whether NPL significantly influences OEOI, and whether NPL and OEOI significantly affect ROA. In addition, the mediating part of OEOI in the correlation between NPL and ROA was tested using the Sobel test. The results are displayed in Table 3.

Table 3. Hypothesis Test

Regression Weights: (Group number 1 - Default model)

			Estimate.	S.E.	C.R.	P	Label.
OEOI	<---	NPL	10,550	1,178	8,953	***	par_1
ROA	<---	OEOI	-,101	,012	-8,743	***	par_2
ROA	<---	NPL	,054	,148	,362	,718	par_3

Note: *** indicates P value < 0.001

Based on the hypothesis testing results:

⇨ NPL has a significant and positive influence on OEOI, with a path coefficient of 10.550. The critical ratio (C.R.) = 8.953 > 1.96 and the probability p < 0.0001, indicating statistical significance. In brief, NPL give positive effect and significant to OEOI. The positive relationship between Non-Performing Loans (NPLs) and the Operating Expenses to Operating Income (OEOI) ratio indicates that higher credit risk leads to

declining operational efficiency. As NPL levels increase, banks are required to allocate more resources to loan monitoring, debt recovery, restructuring processes, and loss provisioning. These activities raise operating expenses at a faster rate than operating income. Consequently, elevated credit risk increases the cost of bank operations, thereby weakening overall efficiency.

- ⇨ OEOI has a significant and negative influence on ROA, with a path coefficient of -0.101. The critical ratio (C.R.) = -8.743 > 1.96 and the probability p < 0.0001, confirming significance. In brief, OEOI give positive effect and significant to ROA. This suggests that banks with relatively higher operating costs compared to income are less capable of converting assets into profits, underscoring the importance of cost-efficiency in maintaining financial performance.
- ⇨ NPL has a positive but non-significant influence on ROA, with a path coefficient of 0.054. The critical ratio (C.R.) = 0.362 < 1.96 and the probability value of 0.718 > 0.05 indicate the effect is not statistically significant. In brief, NPL give positive effect to ROA, but insignificant. This implies that credit risk affects profitability mainly through operational inefficiency rather than through a direct profitability channel. While banks may mitigate risk through pricing or diversification strategies, rising NPLs still increase operational costs, which ultimately reduces profitability.

Table 4 presents the R-squared values. The R-squared values indicate the percentage of variance in the dependent variables described by the independent variables.

Table 4. R-Squared

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
OEOI	,673
ROA	,848

The R-squared value for OEOI is 0.673, suggesting that NPL explains 67.3% of the variance in OEOI. Meanwhile, the R-squared value for ROA is 0.848, indicating that NPL and OEOI together explain 84.8% of the variance in ROA. Subsequently, a mediation test was performed to examine whether OEOI significantly mediates the relationship between NPL and ROA. The mediation analysis was conducted using the Sobel test.

Table 5. Mediation Test

Path	Direct Effect	Indirect Effect	Z Sobel
NPL -> OEOI	10.55		
OEOI -> ROA	-0.101		
NPL -> OEOI -> ROA		-1.06555	6.25515928

Based on the mediation test results reported in Table 5, the indirect effect of non-performing loans (NPL) on return on assets (ROA) through operational efficiency (OEOI) is calculated by multiplying the relevant path coefficients (10.55 × −0.101), yielding an indirect effect of −1.06555. The Sobel test produces a Z-value of 6.255, which exceeds the critical value of 1.96, indicating that OEOI significantly mediates the relationship between NPL and ROA.

This finding provides statistical evidence that credit risk influences bank profitability primarily through its impact on operational efficiency rather than solely through a direct channel.

These results are consistent with the findings of Renta and Kadang (2021), who emphasize the joint role of credit risk and operational efficiency in shaping bank profitability. In line with this literature, the present study suggests that higher levels of NPL do not directly mean into lower profitability directly. Instead, elevated credit risk is associated with declining operational efficiency, which subsequently suppresses ROA. This mechanism likely reflects the additional operational burdens associated with managing problematic loans, including intensified monitoring, collection efforts, restructuring activities, and provisioning requirements, all of which increase operating costs and reduce net returns. The mediation effect further underscores the importance of efficiency as a intervening channel through which credit risk affects financial performance. Within the context of Indonesian state-owned banks, where access to relatively stable and sizable funding sources is generally expected to support lending, the persistence of high NPLs combined with weak operational efficiency may indicate that institutional advantages are not fully translated into optimal operational outcomes. Consequently, differences in profitability across banks and over time appear to be driven less by variations in credit risk levels alone and more by differences in how efficiently such risks are managed operationally.

In brief, the findings highlight that improvements in profitability are closely linked to the ability of banks to integrate credit risk management with efficient operational processes. By demonstrating that OEOI serves as a significant mediating variable, this study contributes to the literature by clarifying the mechanism through which NPL affects ROA in state-owned banks. The results suggest that policies and managerial practices aimed at reducing NPLs are likely to have a more pronounced impact on profitability when accompanied by improvements in operational efficiency, thereby supporting more sustainable financial performance in the state-owned banking sector.

CONCLUSION

This study analyzes the relationship between credit risk—proxied by non-performing loans (NPL)—and profitability (measured by return on assets, ROA) in four Indonesian state-owned commercial banks from 2015–2024, using path analysis and Sobel tests with operational efficiency (operating expenses to operating income, OEOI) as an intervening variable. Results indicate a significant positive effect of NPL on OEOI and a significant negative effect of OEOI on ROA, but an insignificant direct NPL-ROA link; instead, a significant indirect effect confirms OEOI as the key mediating channel, where higher NPLs elevate costs from monitoring, collection, restructuring, and provisioning, eroding efficiency and profitability. These findings underscore that profitability differences stem more from operational risk management than credit risk levels alone, contributing empirical evidence for state-owned banks in emerging economies by emphasizing integrated credit and cost-efficiency strategies for sustainability. Limitations include the narrow sample and single efficiency proxy, limiting generalizability. For future research, scholars could expand to broader bank samples (e.g., private or regional banks), incorporate multidimensional efficiency metrics like cost-income ratios or data envelopment analysis, or apply advanced models such as structural equation modeling to explore moderating factors like digital transformation or regulatory changes.

REFERENCES

Aprilia, Z. (2023, August 4). BUMN dominasi penyaluran kredit, ini juaranya kata bos OJK (Z. Aprilia, Ed.). *CNBC Indonesia*. https://www.cnbcindonesia.com/market/20230804124721-17-460232/bumn-dominasi-penyaluran-kredit-ini-juaranya-kata-bos-ojk

Arrijal Rachman. (2024, June 20). NPL bank naik, ini kata bos Bank Indonesia. *CNBC Indonesia*. https://www.cnbcindonesia.com/market/20240620144140-17-547834/npl-bank-naik-ini-kata-bos-bank-indonesia

Beker, V. A. (2023). Systemic risk and credit risk. In *Edward Elgar Publishing eBooks* (pp. 294–295). Edward Elgar Publishing. https://doi.org/10.4337/9781800377363.ch70

Brik, H. (2024). Climate risk and financial stability: Assessing non-performing loans in Chinese banks. *Journal of Risk Management in Financial Institutions*, 17(3), 303–315.

Darman, D., Maulana, M. A., & Tope, P. (2021). Analisis perbandingan tingkat kesehatan bank BUMN dan bank BUMS di Indonesia. *J-MKLI (Jurnal Manajemen dan Kearifan Lokal Indonesia)*, 4(2), 92. https://doi.org/10.26805/jmkli.v4i2.112

Eviyanti, Y. N., Suhartono, & Kristijadi, E. (2018). The effect of credit risk on bank profitability with efficiency as the intervening variable. *Russian Journal of Agricultural and Socio-Economic Sciences*, 74(2), 179–186. https://doi.org/10.18551/rjoas.2018-02.20

Figueiredo, M. A. L. N. de. (2023). *How corporate banking institutions manage non-performing loans: Case study on BNP Paribas' approach to credit risk management*.

Hasmiana, Madris, & Pintor, S. (2022). The effect of financial risk, capital structure, banking liquidity on profitability: Operational efficiency as intervening variables in persero bank and private commercial banks. *Zenodo*, 5(1). https://doi.org/10.5281/zenodo.7748030

Husnah, H., Suparman, S., & Rauf, R. A. (2023). The role of business credit on SME performance, regional economic output, and unemployment. *Research Horizon*, 3(3), 151–163. https://doi.org/10.54518/rh.3.3.2023.151-163

Hutagalung, A. B., Muslimin, M., & Nainggolan, E. P. (2020). Pengaruh CAR, LDR dan OEOI terhadap ROA perusahaan perbankan konvensional di BEI. *Jurnal Ilmu Manajemen Universitas Tadulako (JIMUT)*, 5(2), 196–210. https://doi.org/10.22487/jimut.v5i2.152

Kadang, J., Mursinto, D., & Purwono, R. (2018). Factors influencing profit efficiency of banking in Indonesia. *Journal of Developing Economies*, 3(2), 1.

Kasmir, S., & Gill, L. (2018). No smooth surfaces: The anthropology of unevenness and combination. *Current Anthropology*, 59(4), 355–377. https://doi.org/10.1086/698927

Maulana, A., Dwita, M., Fitriyani, M., Sunaryo, D., & Adiyanto, Y. (2024). Risk management as a determinant of Indonesian banking financial performance: A systematic literature approach. *Indo-Fintech Intellectuals Journal of Economics and Business*, 4(5), 2523–2537.

Mirović, V., Kalaš, B., Milenković, N., Andrašić, J., & Đaković, M. (2024). Modelling profitability determinants in the banking sector: The case of the Eurozone. *Mathematics*, 12(6), 897.

Mustopa, M., Muslimin, M., & Kadang, J. (2021). Determinants of the profitability of bank

pembangunan daerah in Sulawesi. *Tadulako International Journal of Applied Management*, 3(3), 9–22.

Nurfitria, N., Putri, A. A., Lestari, H. S., & Leon, F. M. (2023). The effect of credit risk management on financial performance in Indonesian banking. *International Journal of Social Science and Human Research*, 6(2), 785–793.

Renta, I. A., & Kadang, J. (2021). Faktor-faktor yang mempengaruhi profitabilitas perbankan Indonesia. *Akuntansi Bisnis & Manajemen (ABM)*, 28(2), 1–10.

Risendy, R., & Samudra, S. (2022). Financial performance analysis BUMN banks and private foreign exchange banks go public on the IDX. *ProBisnis: Jurnal Manajemen*, 13(2), 122–127. https://doi.org/10.62398/probis.v13i2.60

Suwedy, S., Kasim, M. Y., & Husnah, H. (2022). Analysis of financial performance with RGEC method at regional development bank listed on the Indonesian Stock Exchange. *Tadulako International Journal of Applied Management*, 4(3), 1–13.

Swandewi, N. K. M., & Purnawati, N. K. (2021). Capital adequacy ratio mediates the effect of non-performing loan on returns on assets in public commercial banks. *American Journal of Humanities and Social Sciences Research (AJHSSR)*, 5(1), 651–656.

Wahyuningsih, D., & Gunawan, R. (2017). Pengaruh tingkat efisiensi (BOPO) dan kemampuan likuiditas (LDR) dalam menilai kinerja (ROA) perbankan yang terdaftar di BEI. *Jurnal Ilmiah Manajemen dan Bisnis*, 3(3), 420–431. https://doi.org/10.22441/jimb.v3i3.3862