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The Effect of Non Performing Loans, Capital Adequacy Ratio, and Total Assets on the Profitability of HIMBARA from 2021 to 2025

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Abstract-The banking sector plays a crucial role in maintaining the stability of Indonesia's financial system. This study analyzes the effect of Non-Performing Loans (NPL), Capital Adequacy Ratio (CAR), and Total Assets on profitability measured by Return on Equity (ROE) at HIMBARA banks (Bank Mandiri, BRI, BNI, and BTN) for the period Q1 2021 to Q2 2025. The method used is panel data regression analysis with 72 observations using the Panel EGLS (Cross-section weights) approach. Results show that, when considered individually, NPL has a significant negative effect on ROE with a coefficient of -4.28 (prob. 0.0022), while CAR and Total Assets are not significant. ROE from the previous period (ROE(-1)) is the strongest determinant of profitability with a coefficient of 0.627 (prob. 0.0000). Simultaneously, all variables significantly affect ROE, supported by an F-statistic of 64.42 and an R^2 of 88.24%.
Keywords: Capital Adequacy Ratio; HIMBARA; Non Performing Loans; Total Assets

I. INTRODUCTION

The banking sector holds a pivotal role in Indonesia's financial system. Four state-owned banks grouped under HIMBARA (Himpunan Bank Milik Negara) Bank Mandiri, BRI, BNI, and BTN collectively control approximately 40% of total national banking assets (OJK, 2024). The profitability of these four banks serves as a direct indicator of the health of the national financial system and underpins investor confidence and the resilience of the national payment system.

The period from 2021 to 2025 represents a critical phase for HIMBARA banks. It commenced with the impact of non-performing loans following the covid-19 pandemic, followed by monetary policy normalization that triggered interest rate hikes, full implementation of Basel III regulations, and increasingly stiff competition from digital banks and fintech companies [1]. This context makes an examination of the determinants of HIMBARA bank profitability both relevant and urgent.

Return on Equity (ROE) was selected as the profitability proxy because it reflects management's effectiveness in utilizing shareholders' equity to generate profit and is a primary concern for investors. Three main variables are examined: Non-Performing Loans (NPL) as an indicator of asset quality, Capital Adequacy Ratio (CAR) as a reflection of risk absorption capacity, and Total Assets as a proxy for bank size.

This study aims to analyze the effect of NPL, CAR, and Total Assets on the profitability (ROE) of HIMBARA banks for the 2021–2025 period, providing practical implications for bank management and regulators in formulating strategies to improve profitability and strengthen national banking stability.

	N	Rata Rata	Maksimum	Minimum	Std. Deviasi
NPL	72	0.0085	0.0195	0.0026	0.004649034
CAR	72	20.08402778	25.28	20.38	3.251880349
ASET	72	1310347567	2514684368	367515728	667294286.1
Profitabilitas (ROE)	72	0.1746125	0.2731	0.0965	0.04797526

Picture 1. Statistical Data

II. LITERATURE REVIEW

Profitability refers to a company's ability to generate profit from its business activities over a specific period. According to [2] define profitability as a set of policies and decisions that determine how much profit can be obtained from each unit of revenue, assets, or equity. [3] ads that bank profitability is influenced by internal factors (asset quality, capital adequacy, operational efficiency) and external factors (inflation, interest rates, economic growth). In this study, profitability is proxied by ROE: ROE = (Net Income After Tax / Total Equity) × 100%.

Non-Performing Loans (NPL) are loans that experience repayment difficulties, classified into the

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categories of Substandard, Doubtful, and Loss [4] . The OJK sets the maximum gross NPL ratio at 5% of total loans. When loans become non-performing, banks not only lose interest income but must also set aside significant reserves, substantially reducing net income. The theoretical negative relationship between NPL and ROE is consistent with financial intermediation theory. NPL is calculated as: NPL = (Non-Performing Loans / Total Loans) × 100%.

Capital Adequacy Ratio (CAR) measures a bank's ability to absorb risks from its business activities. [5] explains that CAR reflects a bank's resilience to losses. The OJK sets a minimum CAR of 8%, while BUKU IV banks such as HIMBARA banks are required to maintain a minimum CAR of 14%. The relationship between CAR and ROE is generally positive under normal conditions, as well-capitalized banks have greater flexibility to develop profitable loan portfolios. CAR = (Bank Capital / Risk-Weighted Assets) × 100%.

Total assets represent all wealth owned by the bank and are commonly used as a proxy for bank size. In this study, total assets are measured using natural logarithm transformation: Bank Size = Ln(Total Assets), to reduce data scale disparities and avoid heteroscedasticity problems [6]. The relationship between total assets and profitability is generally positive through economies of scale; however, beyond a certain point, additional assets may lead to diseconomies of scale [7] .

III. RESEARCH METHODS

This study employs a quantitative approach with a causal-comparative and descriptive method. The data used are secondary data in the form of quarterly financial statements obtained from the official websites of each bank and the OJK. The population as well as the sample of this study consists of all HIMBARA banks (BRI, BNI, Bank Mandiri, and BTN), with a census technique yielding 72 total observations for the period Q1 2021 to Q2 2025 (balanced panel data).

The data analysis technique includes: (1) descriptive statistical analysis, (2) panel data regression model selection through the Chow Test, Lagrange Multiplier Test, and Hausman Test, (3) classical assumption tests (normality, heteroscedasticity, multicollinearity, autocorrelation, (4) panel data regression analysis with the Fixed Effect Model using Panel EGLS (Cross-section weights) with the addition of a lagged ROE(-1) variable to address autocorrelation, and, (5) hypothesis testing (partial t-test, simultaneous F-test, and coefficient of determination R^2). Data processing was conducted using EViews 13.

IV. RESULT AND DISCUSSIONS

Results

This study analyzes the effect of Non-Performing Loans (NPL), Capital Adequacy Ratio (CAR), and Total Assets on the Return on Equity (ROE) of HIMBARA banks across 72 balanced panel observations spanning Q1 2021 to Q2 2025. The descriptive statistics reveal that NPL averaged 0.85%, well below the OJK tolerance threshold of 5%, with a standard deviation of only 0.46%, indicating consistently stable credit quality across all four banks throughout the observation period. It is important to note that during 2021 to 2022, the OJK granted credit restructuring relaxation in response to the COVID-19 pandemic, which may have partially suppressed reported NPL through a masking effect wherein at-risk loans were shielded from immediate non-performing classification.

Despite this, the financial burden of credit risk remained real, as banks were still obliged to maintain Loan Loss Provisions (CKPN) in accordance with PSAK 71, meaning that credit risk permeated profitability through provisioning costs rather than purely through the NPL ratio itself.

The CAR variable recorded a mean of 20.08%, far exceeding the OJK minimum of 8% and the Basel III standard of 10.5%, reflecting a very strong capital position among HIMBARA banks. Total assets exhibited substantial cross-sectional heterogeneity, ranging from IDR 367.52 trillion for BTN to IDR 2,514.68 trillion for BRI and Bank Mandiri, with a mean of IDR 1,310.35 trillion. The ROE variable averaged 17.46%, with values spanning from 9.65% to 27.31%, indicating that all HIMBARA banks remained profitable above the OJK health threshold of 12.5% throughout the entire study period, albeit with meaningful performance variation driven by differences in business strategy, operational efficiency, and risk management approaches.

In terms of model selection, the Chow Test produced a Cross-section F of 11.12 with a

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probability of 0.0000, indicating that the fixed effect model is superior to the common effect model. This result confirms that statistically significant, time-invariant individual characteristics exist across the four HIMBARA banks that must be controlled in the estimation.

The lagrange multiplier test then yielded a breusch-pagan statistic of 1.45 for the cross-sectional dimension with a probability of 0.2291, confirming that the random effect model offers no improvement over the common effect model for this dimension. The subsequent hausman test produced a chi-square of 33.37 with a probability of 0.0000, decisively rejecting the random effect specification in favor of the fixed effect model. Collectively, these three sequential tests converge on the fixed effect model estimated via Panel EGLS with Cross-section weights as the most appropriate estimator.

The classical assumption diagnostics further validate the reliability of the model. Normality was confirmed through the Jarque-Bera test, which produced a statistic of 0.759 with a probability of 0.684, indicating that the model residuals follow a normal distribution and that t-test and F-test inferences are statistically valid. Heteroscedasticity was detected in the initial estimation an expected outcome given the considerable differences in asset scale across HIMBARA banks and was resolved by applying Panel EGLS with Cross-section weights, which assigns differential weights to each cross-section according to its error variance, producing more efficient and unbiased estimates.

The multicollinearity check showed that the highest correlation among independent variables was between NPL and Total Assets at −0.759, which remains below the critical threshold of 0.8 and is economically interpretable, as larger banks tend to maintain superior credit risk management and more diversified loan portfolios. Autocorrelation was initially detected in the static model specification, with a Durbin-Watson statistic of 0.903 indicating positive autocorrelation.

Following the recommendations of [8] and [9], a lagged dependent variable ROE (−1) was incorporated, transforming the model into a dynamic panel specification. The resulting Durbin-Watson statistic of 1.933 falls within the no-autocorrelation zone, and the F-statistic improved substantially from 37.05 to 64.42, confirming a significantly stronger model fit.

The final regression equation estimated using PanelEGLS with Fixed Effects on 68 observations is as follows: ROE = 0.090 − 4.283(NPL) + 0.0003(CAR) + 5.30E-12(AST) + 0.627 ROE (−1) + ε_i . The constant is significant at the 1% level (prob. 0.0010), reflecting a baseline profitability of approximately 9% attributable to structural factors beyond the model such as brand equity, government mandate, and preferential access to national strategic projects inherent to state-owned banks.

NPL carries a coefficient of −4.283 (prob. 0.0022), confirming a strong negative relationship. CAR records a coefficient of +0.0003 (prob. 0.6641), which is statistically insignificant. Total Assets shows a negligible coefficient of 5.30E-12 (prob. 0.7700), also insignificant. The lagged profitability variable ROE (−1) is the most influential predictor with a coefficient of 0.627 (prob. 0.0000), indicating that 62.7% of the previous period's ROE carries forward into the current period. The model achieves an R^2 of 88.26%, representing strong explanatory power consistent with international benchmarks for bank profitability studies using dynamic panel methods [10], [11]

The simultaneous F-test yields an F-statistic of 64.42 with a probability of 0.0000, confirming that all variables jointly exert a significant influence on ROE, so that H1 is accepted. Regarding the partial tests, NPL has a significant negative effect on ROE so that H2 is accepted, while CAR and Total Assets do not significantly affect ROE so that H3 and H4 are both rejected.

The most critical empirical finding of this study is the significant negative effect of Non-Performing Loans on the Return on Equity of HIMBARA banks, with each one-percentage-point increase in NPL associated with a 4.28-percentage-point reduction in ROE. This result is theoretically grounded in financial intermediation theory, which establishes that deteriorating asset quality imposes a multi-channel drag on bank profitability.

When loans become non-performing, banks lose scheduled interest income, are compelled to increase Loan Loss Provisions (CKPN) in compliance with PSAK 71, and incur additional operational costs associated with credit workout, monitoring, and

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collection. These combined effects directly compress net income and erode the equity return generated for shareholders. The magnitude observed in this study is broadly consistent with, and somewhat stronger than, findings reported by [12], who document an average ROE decline of 2.34% per unit increase in NPL among Indonesian national commercial banks, and aligns with the international literature that consistently identifies credit risk as the primary determinant of bank profitability across diverse economic contexts [10], [13] and [14].

The period from 2021 to 2025 provides a particularly instructive empirical laboratory for understanding the NPL–profitability relationship. The initial phase of this period was shaped by the economic fallout of the COVID-19 pandemic, during which the OJK extended credit restructuring relaxation to prevent a surge in formal NPL classifications. While this policy successfully moderated the reported NPL ratio, it did not eliminate the underlying credit risk.

Banks were still required to form CKPN reserves against potentially impaired assets, meaning that the economic burden of deteriorating credit quality was fully transmitted to profitability through the expense side of the income statement, even when the NPL numerator was artificially compressed. This dynamic wherein regulatory accommodation decouples reported NPL from actual provisioning burden has been documented in comparable post-crisis contexts globally [10] and [15].

As the OJK's restructuring relaxation was gradually phased out from 2023 onward, the latent credit risk in HIMBARA portfolios began to surface more directly in NPL ratios, reinforcing the sensitivity of ROE to credit quality. This trajectory underscores the importance of forward-looking credit risk monitoring that goes beyond reported NPL to encompass expected credit loss metrics and the stress-testing of restructured loan portfolios.

From a managerial standpoint, the strong NPL–ROE sensitivity observed in this study implies that credit quality management constitutes the single most important lever available to HIMBARA management in preserving and enhancing profitability. This encompasses not only the stringency of initial credit underwriting including borrower creditworthiness assessment, collateral adequacy evaluation, and sector concentration limits but also the robustness of ongoing portfolio monitoring, early warning systems for credit deterioration, and the speed and effectiveness of non-performing loan resolution.

Given that HIMBARA banks collectively serve as the backbone of Indonesia's national development financing, including agricultural credit, micro-enterprise lending, and infrastructure project finance, maintaining a robust NPL management framework is not merely a profitability imperative but also a systemic stability concern. Regulatory authorities, particularly OJK and Bank Indonesia, should therefore continue to maintain rigorous supervision of HIMBARA credit quality especially as the post-restructuring normalization phase progresses and legacy restructured loans either perform or crystallize into formal non-performing status.

The non-significant effect of Capital Adequacy Ratio on ROE requires careful interpretation. Standard capital adequacy theory posits a positive relationship between capital buffers and profitability: well-capitalized banks can absorb unexpected losses without distress, maintain depositor confidence, and expand lending operations more freely. However, this relationship is conditional on capital being actively deployed in yield-generating activities.

When capital is held in excess of productive deployment opportunities a condition known as excess capital the incremental contribution of additional capital to profitability diminishes and may even become negative in terms of return on equity, because the equity denominator grows faster than the net income it supports. With HIMBARA banks maintaining average CARs of 20.08%, far exceeding both the regulatory floor and the BUKU IV minimum of 14%, they are operating in precisely this excess capital territory. This finding is consistent with [16], who demonstrates that at elevated capitalization levels the marginal return contribution of additional capital deteriorates significantly, and with [13], who similarly document a weakening CAR profitability nexus in well-capitalized Southeast Asian banking systems.

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Discussions

The post-pandemic context adds a further explanatory layer. Following the economic disruptions of 2020 and 2021, HIMBARA banks adopted more conservative risk management postures, limiting aggressive credit expansion and preferring to hold excess capital in lower-yielding but safer instruments such as government securities and central bank placements. This behavioral shift meant that the large capital buffer provided insurance against downside risk rather than being channeled into profitable growth, resulting in a high CAR that does not translate into proportionally higher ROE.

The strategic implication for HIMBARA management is therefore not to reduce capital which would compromise regulatory compliance and systemic resilience but to identify and execute productive capital deployment avenues. These include measured expansion of retail and MSME credit in underserved segments, development of fee-based income streams through digital financial services and transaction banking, and strategic investment in technology infrastructure that enhances operational efficiency and revenue per unit of equity. This reframing from capital sufficiency to capital productivity aligns with the broader trajectory of Indonesian banking policy, which increasingly emphasizes value creation from existing resources over the accumulation of additional buffers [17] and [18].

The insignificance of Total Assets in the dynamic panel model reflects the internalization of scale-driven efficiency gains within the lagged profitability variable. In a static specification, total assets may appear significant because the historical profitability benefits of operating at larger scale economies of scale in technology, operations, and funding costs, as well as economies of scope through product diversification are conflated with the persistence of past profitability.

Once ROE(−1) is included in the model, the direct short-run contribution of bank size to current-period profitability becomes statistically negligible, suggesting that whatever scale benefits exist are already embedded in the trajectory of historical returns. This finding is consistent with [19], who demonstrate that the effect of bank size on HIMBARA profitability operates primarily through indirect, lagged channels rather than contemporaneously. It also resonates with the broader international evidence from [7] and [20], who observe that beyond an optimal scale threshold, additional asset growth generates organizational complexity, coordination costs, and bureaucratic inefficiency that increasingly offset the benefits of size.

The post-pandemic shift in banking strategy is again relevant here: where pre-pandemic growth trajectories were characterized by aggressive balance sheet expansion, the 2021–2025 period saw a pivotal reorientation toward efficiency, quality, and risk-adjusted returns. HIMBARA banks, already among the largest in the ASEAN region by total assets, face diminishing returns from further balance sheet expansion without a corresponding improvement in asset utilization.

For BRI and Bank Mandiri, which already manage assets exceeding IDR 2,000 trillion, the challenge is less about growing the balance sheet and more about optimizing the productivity of existing assets reducing idle or underperforming positions, improving loan-to-deposit ratios, and transitioning toward higher-margin credit segments.

For BTN, which operates at a substantially smaller scale with assets of approximately IDR 367 trillion, there may remain meaningful scale economies to be captured through targeted expansion, particularly in its core mortgage lending segment. This heterogeneity in scale dynamics within HIMBARA suggests that uniform asset growth strategies may be suboptimal, and that bank-level profitability strategies should be calibrated to each institution's position on the scale efficiency curve.

The most distinctive and theoretically significant finding of this study is the strong profitability persistence captured by the lagged ROE variable. With a coefficient of 0.627 and a probability of 0.0000, ROE(−1) emerges as the single most influential determinant of current-period profitability among all variables in the model, implying that 62.7% of each quarter's ROE is structurally determined by the prior quarter's performance.

This degree of persistence reflects the operation of deep, slow-moving competitive advantages that cannot be replicated or eroded within a single reporting period. Established customer relationships built over decades, the trust and brand

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recognition associated with state-owned status, preferential access to government salary disbursement accounts and social program distribution mandates, accumulated institutional knowledge in credit assessment, and continuously refined operational processes all contribute to a self-reinforcing profitability dynamic that is largely predetermined by prior performance.

The speed of adjustment parameter, which at 37.3% per quarter indicates the fraction of the gap between current and long-run equilibrium ROE that is closed in each period, suggests that while HIMBARA banks do converge toward their sustainable profitability level, the process is gradual rather than rapid. This has important implications for both management and policymakers.

For management, it means that improvements in credit quality, capital deployment, and operational efficiency will take multiple quarters to fully materialize in reported profitability, and that strategic decisions made today establish the structural baseline from which future performance will compound. Conversely, deteriorations in fundamentals—such as an increase in NPL or a period of operational disruption will also propagate through subsequent quarters, underscoring the importance of maintaining consistent management quality and avoiding the temptation to optimize short-term results at the expense of long-term structural health.

Policymakers, the high degree of profitability persistence raises questions about the competitive dynamics of the Indonesian banking sector: if HIMBARA banks derive a substantial share of their profitability from structural incumbency advantages rather than from period-to-period operational decisions, then policies designed to stimulate competition and reduce entry barriers become particularly important for ensuring that the efficiency benefits of competition reach depositors and borrowers over time.

Internationally, comparable profitability persistence has been documented by [21] for Indonesian banks more broadly, by [22] for US banks during financial crises who note that banks with strong pre-crisis market positions maintain superior performance through subsequent stress periods and by [23] in a cross-country comparison of conventional and Islamic banks.

The speed of adjustment of 37.3% observed in this study is consistent with the range of 25–45% reported in comparable dynamic panel studies of bank profitability [24], indicating that HIMBARA's adjustment dynamics are broadly in line with international peers. However, the absolute level of the persistence coefficient (0.627) is somewhat higher than the median reported in cross-country studies, suggesting that HIMBARA banks benefit from particularly entrenched structural advantages likely reflecting their combined dominance of approximately 40% of total national banking assets and their institutionalized roles in government financial services.

Taken in synthesis, the empirical findings of this study paint a coherent and integrated portrait of HIMBARA bank profitability dynamics during the 2021–2025 period. Profitability is primarily anchored by structural momentum from prior-period performance, reflecting deep competitive advantages that compound over time. It is most immediately and materially vulnerable to deterioration in credit quality, with NPL serving as the key short-run lever through which management decisions and economic conditions translate into profitability outcomes.

By contrast, variation in capitalization and asset scale within the ranges observed in this sample does not produce meaningful differences in short-run profitability, suggesting that HIMBARA banks have largely optimized their structural positions with respect to these dimensions, and that the marginal returns to further capital accumulation or asset expansion are limited without qualitative improvements in how capital and assets are deployed.

The optimal profitability management strategy for HIMBARA banks therefore requires a dual focus. On the defensive side, maintaining rigorous credit underwriting, early-warning monitoring systems, and proactive non-performing loan resolution is essential to protect the structural profitability baseline from credit quality shocks particularly as the post-restructuring normalization phase creates uncertainty around the true performance of legacy restructured loans.

On the offensive side, the productive deployment of excess capital estimated at roughly six percentage points above the BUKU IV minimum toward measured credit expansion in high-potential

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segments, digital product development, and fee-based income diversification offers the clearest path to improving the ROE generated per unit of equity. This integrated approach, which combines disciplined risk management with active capital productivity optimization, aligns with the regulatory directions set by OJK and Bank Indonesia for the Indonesian banking sector's strategic roadmap and is consistent with the evolving expectations of institutional investors who increasingly evaluate bank performance through a risk-adjusted return lens rather than purely on the basis of reported profit growth.

V. CONCLUSION AND SUGGESTION

The results show that NPL has a negative and significant effect on ROE, making credit quality the primary factor determining a bank's profitability level. The higher the level of non-performing loans, the greater the pressure on the bank's profits due to increased credit risk and provisioning costs. Conversely, CAR and Total Assets did not show a significant effect on ROE during the study period. These findings indicate that the size of a bank's capital or assets does not necessarily improve profitability if not accompanied by effective and productive management.

Furthermore, profitability in the previous period was found to have a strong influence on profitability in the current period, indicating performance persistence at HIMBARA Banks. This suggests that the banks' ability to generate profits is influenced not only by current conditions but also by the success of strategies and performance established in previous periods. Simultaneously, the previous period's NPL, CAR, Total Assets, and ROE were found to account for the majority of the variation in Bank HIMBARA's profitability. Thus, sound credit quality management is the most critical factor in maintaining the stability and sustainability of banking financial performance.

Based on the research findings, the management of HIMBARA banks is advised to treat credit risk management as the main priority in sustaining profitability. The NPL coefficient of −4.283 shows that every one-percentage-point increase in non-performing loans reduces ROE by about 4.28 percentage points, so even a small deterioration in credit quality can erase a substantial part of shareholder returns. Management should therefore strengthen credit analysis through more selective borrower assessment, adequate collateral evaluation, and sector concentration limits.

Regular portfolio monitoring supported by early warning systems should also be established so that signs of deterioration are detected before loans become non-performing. When non-performing loans do occur, they should be resolved promptly and effectively through restructuring, collection, or write-off, so that provisioning costs do not accumulate over several periods. This matters all the more because profitability persists across periods (ROE(−1) = 0.627, with 37.3% of the gap to long-run ROE closed each quarter), meaning that the effects of a credit quality shock will carry into later quarters.

Regulators, the results can serve as a basis for strengthening supervision of banking credit quality. Supervision should not rely only on reported NPL ratios, because the COVID-19 restructuring relaxation may have suppressed NPL while provisioning costs continued to affect profitability. It is therefore recommended that regulators also monitor the quality of restructured loans, the adequacy of loan loss provisions, and the results of stress tests, particularly now that the relaxation has ended. Regulators could also encourage banks with excess capital to use it productively by supporting lending to priority sectors, without lowering prudential standards.

Future research is recommended to expand the scope of the study by including other internal and external variables, such as BOPO, LDR, NIM, inflation, and Bank Indonesia's interest rates, to give a more comprehensive picture of the factors influencing banking profitability. Further studies could also lengthen the observation period, add other banks such as private and regional development banks for comparison, test the lagged effect of NPL, and use alternative profitability measures such as ROA, so that the findings can be generalized more widely.

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