

Does Capital Structure Adjustment Improve Bank Profitability? Evidence from Dynamic Panel Models of Indonesian State-Owned Banks

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ARTICLE INFO

Article history:

Received 2025-09-18
Revised 2025-12-18
Accepted 2026-01-17
Published 2026-02-18

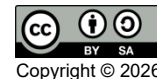
Keywords:

Bank profitability; Capital adequacy ratio; Capital restructuring; Dynamic panel data; Non-performing loans; Operational efficiency; State-owned banks

Abstract

This study examines the effect of capital restructuring on the profitability of Indonesian state-owned banks. Profitability is measured using Return on Assets (ROA), while capital restructuring is represented by the Debt-to-Equity Ratio (DER) and Capital Adequacy Ratio (CAR). Non-performing loans (NPL) and operating expenses to operating income (BOPO) are included as control variables. The study uses panel data from four Indonesian state-owned banks—Bank Rakyat Indonesia, Bank Negara Indonesia, Bank Tabungan Negara, and Bank Mandiri—over the period 2019–2023. The analysis employs both static and dynamic panel regression methods, including Pooled Least Squares (PLS), Fixed Effects Model (FEM), Random Effects Model (REM), Difference GMM, and System GMM. The results indicate that operational efficiency, represented by BOPO, consistently has a negative and significant effect on bank profitability. The System GMM estimation suggests that capital restructuring variables significantly influence profitability. These findings highlight the importance of efficient cost management and sound capital structure policies in improving the financial performance of state-owned banks.

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How to cite item:

Ramadhan, A. F., Bayu, F. F., & Wibowo, W. (2026). Does Capital Structure Adjustment Improve Bank Profitability? Evidence from Dynamic Panel Models of Indonesian State-Owned Banks. *Journal of Regional Economics Indonesia*, 7(1), 53–66.

1. Introduction

The banking sector plays a crucial role in supporting economic development through financial intermediation and capital allocation. In Indonesia, the banking industry consists of four main categories: state-owned banks, domestic commercial banks, foreign commercial banks, and joint venture banks. Among these categories, state-owned banks—commonly referred to as State-Owned Enterprises (BUMN)—are predominantly owned by the government and play a strategic role in maintaining financial stability and supporting national economic growth. The four major state-owned banks in Indonesia are Bank Rakyat Indonesia (BRI), Bank Negara Indonesia (BNI), Bank Tabungan Negara (BTN), and Bank Mandiri (Haryanto et al., 2019). During the COVID-19 pandemic, these banks continued to play an important role in supporting economic recovery. In the second quarter of 2021, state-owned banks contributed approximately 7.07% to national economic growth, highlighting their importance in maintaining economic resilience (Marlina et al., 2021; Yusuf & Ichsan, 2021).

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Bank performance is commonly evaluated using profitability indicators. Profitability reflects a bank's ability to generate income from its assets and operations, which ultimately determines its sustainability and value to shareholders. One of the most widely used indicators of banking profitability is Return on Assets (ROA). ROA measures the ability of banks to generate earnings from their asset base and is therefore widely used in empirical banking studies (Amidjaya & Widagdo, 2020; Barrdear & Kumhoff, 2022). Higher profitability indicates better financial performance and stronger managerial efficiency in utilizing available resources. Consequently, understanding the factors that influence bank profitability has become an important topic in banking and financial research.

One factor that may influence bank profitability is capital restructuring. Capital restructuring refers to strategic decisions related to adjusting a firm's capital structure, particularly the composition of debt and equity used to finance its operations. Effective capital restructuring can strengthen a bank's financial structure, improve its resilience to financial risks, and enhance its competitiveness in the financial market (Murugi et al., 2022). From a financial management perspective, an optimal capital structure allows banks to balance the benefits and costs associated with different financing sources, thereby improving financial performance and shareholder value (Ithuku and Mwangi, 2021). In empirical banking research, capital restructuring is commonly measured using indicators such as the Debt-to-Equity Ratio (DER) and the Capital Adequacy Ratio (CAR), both of which reflect the financial structure and capital strength of banking institutions (Okonkwo et al., 2023).

In addition to capital structure, several other factors may influence bank profitability. Credit risk is often proxied by Non-Performing Loans (NPL), which measure the proportion of problematic loans relative to total credit. Higher NPL levels generally indicate greater credit risk and may reduce bank profitability due to increased loan loss provisions. Operational efficiency is another important determinant of bank performance, commonly measured by the ratio of Operating Expenses to Operating Income (BOPO). A higher BOPO ratio indicates lower operational efficiency and may negatively affect profitability (Winasis et al., 2020a; Winasis et al., 2020b).

Previous empirical studies have examined the relationship between capital structure and bank profitability in different countries and contexts. Several studies find that capital structure has a positive and significant impact on banking profitability. For example, Adesina et al. (2015) found that capital structure positively influences the financial performance of banks in Nigeria. Similar results were reported by Kipsha and James (2014) in Tanzania and Garr and Awadzie (2023) in Ghana, suggesting that stronger capital structures may enhance banking profitability. However, other studies report inconsistent findings. Taani (2013) found that capital structure has a positive but insignificant effect on banking performance in Jordan, while Gohar and Rehman (2016) reported a negative but insignificant relationship in Pakistan. These mixed findings suggest that the relationship between capital restructuring and profitability may vary depending on institutional settings, regulatory environments, and bank characteristics.

Despite the important role of state-owned banks in Indonesia, empirical studies examining the impact of capital restructuring on their profitability remain relatively limited. Most previous studies focus on the general banking sector or private banks, leaving a gap in understanding how capital restructuring affects the performance of state-owned banking institutions. Given the strategic importance of these banks in supporting national economic development, further investigation into their financial performance determinants is necessary.

Therefore, this study aims to examine the effect of capital restructuring on the profitability of Indonesian state-owned banks. Using panel data from four major state-owned banks – BRI, BNI, BTN, and Bank Mandiri – over the period 2019–2023, this study employs both static and dynamic panel regression approaches to provide robust empirical evidence. By incorporating capital structure variables (DER and CAR) along with credit risk (NPL) and operational efficiency (BOPO), this study

contributes to the literature by providing a comprehensive analysis of the determinants of profitability in Indonesian state-owned banks.

2. Literature Review

Profitability Theory

Profitability is one of the most important indicators used to assess firm performance and financial sustainability. In the banking industry, profitability reflects the ability of banks to generate income from their assets, capital, and operational activities. According to Church and Ware (2000) and Lipczynski et al. (2017), there are several approaches commonly used to measure profitability, including Tobin's q, Price Cost Margin (PCM), and the Accounting Rate of Profit (ARP).

Tobin's q measures the ratio between the market value of a firm and the replacement cost of its assets. This measure reflects the market's valuation of a firm's future profitability relative to its current asset base. The Tobin's q equation is presented as follows:

$$q = \frac{M_c + M_p + M_d}{A_t}$$

In this equation, M_c represents the market value of common stock, M_p represents the market value of preferred stock, M_d refers to the market value of the firm's outstanding debt, and A_t represents the replacement cost of total assets. If the value of q equals one, the firm's market value is equal to the replacement cost of its assets. When q is greater than one, the market values the firm more highly than its recorded assets, indicating potential competitive advantages or superior managerial performance. Conversely, when q is less than one, the firm's market value is lower than the replacement cost of its assets, suggesting inefficiency or poor management performance (Church & Ware, 2000).

Another approach used to measure profitability is the Price Cost Margin (PCM), which reflects the ratio between profit and sales. PCM is commonly associated with the Lerner Index, which measures the degree of market power possessed by a firm. The PCM equation is shown as follows:

$$PCM = \frac{TR - TC}{TR}$$

In this equation, TR represents total revenue, TC represents total cost, AC represents average cost, Q represents quantity, and P represents price. The Lerner Index evaluates the extent to which firms can set prices above marginal cost. If price (P) exceeds marginal cost (MC), the firm earns monopoly-like profits, while in perfectly competitive markets price equals marginal cost (Lipczynski et al., 2017). The Lerner Index is calculated as:

$$L = \frac{P - MC}{P}$$

The Accounting Rate of Profit (ARP) measures the relationship between accounting profit and invested capital. Unlike accounting profit, economic profit considers both explicit and implicit costs. Economic profit can be expressed as:

$$\pi = TR - TC$$

Where: π = Economic profit, TR = Total Revenue, TC = Total Cost

Total cost consists of explicit costs and implicit costs:

$$TC = EC + IC$$

Where: EC = Explicit cost, IC = Implicit cost

Explicit costs include measurable monetary expenses such as wages, interest payments, and operational expenses. Implicit costs represent opportunity costs, including managerial effort and foregone alternative investments.

The rate of return measures the relationship between investment and income generation. It can be expressed as follows:

$$rr = \frac{\pi}{K}$$

Where: rr = rate of return, π = economic profit, K = capital investment

Another representation of the rate of return is:

$$r = i + \delta$$

Where: r = rental rate of capital, i = interest rate (cost of capital), δ = depreciation rate

These profitability measures are widely used in financial and industrial organization studies to evaluate firm performance and efficiency (Church & Ware, 2000; Lipczynski et al., 2017).

Capital Restructuring Theory

Capital restructuring refers to strategic decisions related to changes in a firm's capital structure, particularly adjustments in the proportion of debt and equity used to finance business operations. According to Bodie et al. (2009), firms can obtain financing through internal or external sources. Internal financing generally includes retained earnings and internally generated funds, while external financing involves funding from external parties such as creditors and investors.

External financing can be classified into two major categories: debt financing and equity financing. Equity financing includes common shares, preferred shares, and stock options, while debt financing typically consists of loans, bonds, and other financial obligations. The choice between these financing alternatives affects a firm's capital structure and financial performance.

Several theoretical frameworks explain corporate capital structure decisions. Constantinides et al. (2003) identify three major theories commonly used to analyze capital structure: trade-off theory, agency theory, and pecking order theory.

Trade-off theory suggests that firms balance the tax advantages of debt financing against the potential costs of financial distress and bankruptcy. While increasing debt may provide tax benefits, excessive debt increases the risk of financial instability. Therefore, firms seek an optimal capital structure that maximizes firm value.

Agency theory focuses on conflicts of interest between managers and shareholders. Changes in capital structure can influence managerial incentives and monitoring mechanisms. For example, higher debt levels may reduce managerial discretion and encourage more efficient management practices.

Pecking order theory explains that firms prefer internal financing over external financing due to information asymmetry between managers and external investors. Firms first use retained earnings, then debt financing, and finally issue equity as a last resort.

In addition to these theories, Laopodis (2021) highlights the free cash flow theory, which emphasizes the role of debt in disciplining managers and reducing inefficient investment decisions. According to this theory, higher debt levels may limit managerial discretion and encourage efficient allocation of corporate resources.

These theoretical perspectives provide a framework for understanding how capital restructuring decisions may influence corporate financial performance, including profitability in the banking sector.

Capital Restructuring and Profitability

A large body of empirical literature has examined the relationship between capital structure and financial performance in the banking industry. Several studies find that capital structure has a positive and significant impact on bank profitability.

Adesina et al. (2015) examined the relationship between capital structure and financial performance in Nigeria using Ordinary Least Squares (OLS). Their findings indicate that capital structure has a positive and significant effect on bank profitability. Similarly, Kipesha and James (2014) analyzed the relationship between capital structure and firm performance in Tanzania using panel regression methods. Their results show that capital structure has a positive and significant effect on profitability in the long run.

In addition, Garr and Awadzie (2023) investigated the impact of capital structure on bank profitability in Ghana and found that capital structure significantly improves financial performance. Begum et al. (2022) also reported a positive and significant relationship between capital structure and profitability in the case of Janata Bank Limited in Bangladesh.

However, empirical findings on this relationship remain mixed. Taani (2013) examined the effect of capital structure on banking performance in Jordan and found that capital structure has a positive but statistically insignificant effect on profitability. Similarly, Ibrahim (2019) found that capital structure has a positive but insignificant relationship with financial performance. In contrast, Gohar and Rehman (2016) reported a negative but insignificant relationship between capital structure and banking performance in Pakistan.

These inconsistent findings suggest that the impact of capital restructuring on bank profitability may vary depending on institutional context, regulatory frameworks, and banking system characteristics.

Non-Performing Loans and Profitability

Credit risk is one of the key determinants of bank profitability. Non-performing loans (NPL) represent loans that borrowers fail to repay according to agreed terms. High levels of NPL indicate poor credit quality and may negatively affect bank profitability due to increased loan loss provisions and reduced interest income.

Vinh (2017) examined the impact of NPL on bank profitability and lending behavior in Vietnam using the Generalized Method of Moments (GMM). The results indicate that NPL has a negative and significant effect on bank profitability. Similarly, Bhattarai (2016) found that higher levels of NPL significantly reduce the profitability of commercial banks in Nepal.

These findings highlight the importance of effective credit risk management in maintaining bank financial performance.

Operational Efficiency and Profitability

Operational efficiency is another important factor affecting bank profitability. In the banking industry, operational efficiency is commonly measured using the ratio of operating expenses to operating income (BOPO). A higher BOPO ratio indicates lower efficiency in bank operations.

Titin (2016) examined the relationship between BOPO and the profitability of Islamic banks in Indonesia and found that BOPO has a negative and significant effect on bank profitability. This suggests that higher operational costs reduce the ability of banks to generate profits.

Hypothesis Development

Based on the theoretical framework and previous empirical findings discussed above, the following hypotheses are proposed:

H1: Capital restructuring has a positive and significant effect on the profitability of state-owned banks.

H2: Non-performing loans have a negative and significant effect on the profitability of state-owned banks.

H3: Operating expenses to operating income have a negative and significant effect on the profitability of state-owned banks.

3. Methodology

Research Design

This study employs a quantitative research approach using panel data regression to analyze the relationship between capital restructuring and bank profitability. Panel data combines cross-sectional and time-series observations, allowing researchers to capture both individual heterogeneity and temporal dynamics within the dataset. The use of panel data provides several advantages, including increased variability, reduced collinearity among explanatory variables, and improved estimation efficiency compared to purely cross-sectional or time-series data (Alviani, 2021).

The study uses both static and dynamic panel data models to provide robust empirical results. The static panel models include the Common Effect Model (CEM) or Pooled Least Squares (PLS), the Fixed Effect Model (FEM), and the Random Effect Model (REM). In addition, dynamic panel regression models are applied using the Generalized Method of Moments (GMM), which consists of Difference GMM and System GMM estimators. The GMM approach is widely used in dynamic panel data analysis because it can address potential endogeneity issues, heteroscedasticity, and autocorrelation in panel datasets (Clark & Linzer, 2015).

Data and Sample

This study uses secondary data obtained from the audited financial statements of four Indonesian state-owned banks: Bank Rakyat Indonesia (BRI), Bank Negara Indonesia (BNI), Bank Tabungan Negara (BTN), and Bank Mandiri. These banks represent the major state-owned banking institutions operating in Indonesia and play a crucial role in supporting national economic development.

The observation period covers five years, from 2019 to 2023. The data were collected from the annual financial reports published by each bank. By combining cross-sectional data from four banks with time-series data over five years, the dataset forms a balanced panel structure.

Variables and Measurement

This study uses Return on Assets (ROA) as the dependent variable representing banking profitability. The independent variables representing capital restructuring are the Debt-to-Equity Ratio (DER) and Capital Adequacy Ratio (CAR). In addition, Non-Performing Loans (NPL) and Operating Expenses to Operating Income (BOPO) are included as control variables. The variables used in this study are summarized in Table 1.

ROA measures the ability of banks to generate profit from their total assets. DER reflects the proportion of debt relative to equity used by banks in financing their operations. CAR represents the capital adequacy level required by banking regulations to absorb potential financial losses. NPL indicates the level of credit risk faced by banks, while BOPO reflects the operational efficiency of banking activities.

Table 1. Variable Detail Explanation

Variable	Measurement	Definition	Hypothesis
ROA	%	Return on Assets representing banking profitability	
DER	%	Debt-to-Equity Ratio representing capital restructuring	+
CAR	%	Capital Adequacy Ratio representing bank capital strength	+
NPL	%	Non-performing loan ratio representing credit risk	-
BOPO	%	Operating expenses to operating income ratio representing operational efficiency	-

Model Specification

The theoretical model used in this study refers to Puspitasari et al. (2021), which explains the relationship between profitability and banking financial indicators. The theoretical model is expressed as follows:

$$ROA = f(DER, CAR, NPL, BOPO)$$

To empirically test the relationship between capital restructuring and profitability, the following panel regression model is specified:

$$ROA_{it} = \beta_0 + \beta_1 DER_{it} + \beta_2 CAR_{it} + \beta_3 NPL_{it} + \beta_4 BOPO_{it} + \epsilon_{it}$$

Where: ROA = Return on Assets, DER = Debt-to-Equity Ratio, CAR = Capital Adequacy Ratio, NPL = Non-performing Loans, BOPO = Operating Expenses to Operating Income, i = cross-sectional unit (bank) t = time period, ϵ = error term. The empirical model used in this study refers to Priharto and Gani (2024), which employs panel data regression to analyze determinants of bank profitability.

Panel Data Estimation Techniques

Panel data regression can be estimated using three primary approaches: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM). These models are categorized as static panel data models.

The Common Effect Model assumes that all cross-sectional units share identical intercepts and slope coefficients. The Fixed Effect Model allows intercepts to vary across cross-sectional units in order to capture unobserved heterogeneity. The Random Effect Model assumes that individual-specific effects are random variables that are uncorrelated with the explanatory variables.

In addition to static panel regression models, this study also applies dynamic panel regression using the Generalized Method of Moments (GMM). Dynamic panel regression incorporates lagged dependent variables as explanatory variables in order to capture persistence in the dependent variable over time (Hsiao, 2007).

The GMM approach is divided into two estimators: Difference GMM and System GMM. Difference GMM transforms the original data by taking first differences to eliminate individual effects, while System GMM combines equations in both levels and differences to improve estimation efficiency.

The GMM estimator offers several advantages for panel data analysis. First, it does not require strict distributional assumptions such as normality. Second, it is capable of addressing heteroscedasticity and autocorrelation problems. Third, it allows researchers to control for potential endogeneity issues in explanatory variables (Clark & Linzer, 2015). Therefore, GMM is widely used in dynamic panel data models to produce consistent and efficient estimators (Hsiao, 2007; Sihombing and Kristanti, 2024).

Hypothesis Testing

Hypothesis testing in static panel regression models is conducted using the t-test to evaluate the statistical significance of individual regression coefficients. The t-test determines whether each independent variable significantly influences the dependent variable while holding other variables constant. A coefficient is considered statistically significant if the p-value is smaller than the predetermined significance level.

In dynamic panel regression models estimated using GMM, the partial significance of coefficients is evaluated using the Z-test. The hypothesis for the partial test is formulated as follows:

$$H_0: \beta_j = 0$$

$$H_1: \beta_j \neq 0$$

The test statistic is calculated as:

$$Z = \frac{\hat{\beta}_j}{SE(\hat{\beta}_j)}$$

The null hypothesis is rejected if:

$$|Z| > Z_{\alpha/2}$$

or if the p-value is smaller than the significance level. This study adopts a significance level of 10 percent for hypothesis testing (Elvis et al., 2018; Ihza and Bawono, 2022).

4. Results

Descriptive Statistics

Descriptive statistics provide an overview of the characteristics of the variables used in this study, including the mean, standard deviation, minimum value, and maximum value. These statistics (see Table 2) help illustrate the distribution and variability of the variables across the observed period.

Table 2. Descriptive Statistics Result

Variable	Mean	Standard deviation	Minimum	Maximum
ROA	2.177	1.450953	0.13	4.03
DER	7.808	1.215718	4.75	16.07
CAR	20.6215	3.668887	16.8	25.28
NPL	3.0205	2.214508	1.02	4.78
BOPO	75.697	0.8902896	51.88	98.12

The descriptive statistics show that the average Return on Assets (ROA) of Indonesian state-owned banks during the period 2019–2023 was 2.177 percent, with a minimum value of 0.13 percent and a maximum value of 4.03 percent. This indicates that profitability varied significantly across banks and time periods.

The average Debt-to-Equity Ratio (DER) was 7.808 percent, with values ranging from 4.75 percent to 16.07 percent, indicating variation in capital structure among the observed banks. Meanwhile, the Capital Adequacy Ratio (CAR) recorded an average value of 20.6215 percent, suggesting that state-owned banks generally maintained capital levels well above regulatory minimum requirements.

For the credit risk indicator, the average Non-Performing Loans (NPL) ratio was 3.0205 percent, with values ranging from 1.02 percent to 4.78 percent. This indicates that credit risk remained within a relatively manageable range during the observation period.

Operational efficiency, measured using BOPO, had an average value of 75.697 percent, indicating that operational expenses accounted for a significant proportion of bank operating income.

Panel Regression Results

This study employs both static and dynamic panel regression approaches to examine the relationship between capital restructuring and bank profitability. The static panel models include the Common Effect Model (CEM/PLS), the Fixed Effect Model (FEM), and the Random Effect Model (REM). Meanwhile, the dynamic panel models include the Two-Step Difference GMM and the Two-Step System GMM. The estimation results from these models are presented in Table 3.

Table 3. Static and Dynamic Panel Estimation Result

Variable	CEM/PLS	FEM	REM	Two Step Diff GMM	Two Step Sys GMM
DER	-0.03116591 (0.170)	-0.03534573 (0.452)	-0.03116591 (0.149)	-0.00842107 (0.683)	0.69098519** (0.001)
CAR	0.14647288*** (0.000)	0.036113 (0.386)	0.14647288*** (0.000)	0.02699125 (0.130)	0.49092987*** (0.000)
NPL	0.11860336 (0.434)	0.04417718 (0.716)	0.11860336 (0.421)	-0.42716444 (0.119)	2.551641*** (0.000)
BOPO	-0.07900863*** (0.000)	-0.08596032*** (0.000)	-0.07900863*** (0.000)	-0.06228335*** (0.000)	-0.2790547*** (0.000)

Notes:

Numbers in parentheses represent p-values.

*** Significant at 1% level

** Significant at 5% level

Interpretation of Regression Results

The estimation results indicate several important findings regarding the determinants of profitability in Indonesian state-owned banks.

First, the BOPO variable consistently shows a negative and statistically significant effect on ROA across all estimation models. This result indicates that higher operational expenses relative to operating income reduce bank profitability. The finding suggests that operational efficiency plays a crucial role in determining financial performance in the banking sector.

Second, the CAR variable exhibits a positive and significant effect on ROA in the CEM/PLS and REM models, as well as in the Two-Step System GMM model. This finding suggests that higher capital adequacy strengthens bank profitability by providing financial stability and enhancing the ability of banks to absorb potential financial risks.

Third, the DER variable shows mixed results across different models. In the static panel models (CEM/PLS, FEM, and REM), DER has a negative but statistically insignificant effect on ROA. However, in the Two-Step System GMM estimation, DER shows a positive and significant effect on profitability. This indicates that capital restructuring may improve bank profitability when dynamic adjustments in capital structure are considered.

Fourth, the NPL variable produces inconsistent results across estimation models. In the static panel regressions, NPL shows a positive but statistically insignificant effect on ROA. In the Difference GMM model, NPL has a negative but insignificant effect. However, in the System GMM model, NPL exhibits a positive and significant relationship with profitability.

Hypothesis Testing

The hypothesis testing results vary depending on the estimation method used.

Based on the PLS estimation results, the first hypothesis is rejected because DER has a negative and insignificant effect on profitability, although CAR shows a positive and significant effect. The second hypothesis is also rejected because NPL has a positive but insignificant effect on profitability. The third hypothesis is accepted because BOPO has a negative and significant effect on profitability.

The FEM estimation results also reject the first and second hypotheses, as DER and NPL are not statistically significant. However, the third hypothesis is supported because BOPO significantly affects profitability.

The REM results produce similar findings to the PLS model, confirming the significant positive effect of CAR and the significant negative effect of BOPO on ROA.

The Difference GMM estimation results show that only BOPO significantly influences profitability, while DER, CAR, and NPL remain statistically insignificant.

Finally, the Two-Step System GMM model produces the most comprehensive results, indicating that DER, CAR, and NPL have significant positive effects on profitability, while BOPO has a significant negative effect. Based on these results, the first and third hypotheses are supported, while the second hypothesis is rejected.

5. Discussion

The empirical results of this study provide important insights into the determinants of profitability in Indonesian state-owned banks. The analysis using both static and dynamic panel regression models indicates that capital restructuring, credit risk, and operational efficiency play significant roles in shaping bank profitability. The findings highlight the importance of financial structure management and operational efficiency in maintaining the stability and performance of banking institutions.

One of the most consistent findings across the estimation models is the significant negative effect of BOPO on bank profitability. The results indicate that higher operating expenses relative to operating income significantly reduce the Return on Assets (ROA) of state-owned banks. This finding confirms the importance of operational efficiency in banking performance. From a financial management perspective, banks that are able to control operational costs more effectively are more likely to achieve higher profitability levels. This result is consistent with the findings of Titin (2016), which show that higher operational costs negatively affect bank profitability. Operational inefficiency may reduce the bank's ability to allocate financial resources efficiently and may also weaken the bank's competitiveness in the financial market.

The results also show that the Capital Adequacy Ratio (CAR) has a positive and significant effect on profitability in several estimation models, particularly in the CEM/PLS, REM, and System GMM models. This finding suggests that stronger capital adequacy improves bank financial performance. Banks with higher capital buffers are better able to absorb potential financial shocks and maintain operational stability. From a regulatory perspective, adequate capital levels allow banks to expand lending activities and increase income generation while maintaining financial stability. These findings support the theoretical arguments of capital structure theory, which emphasize the importance of optimal capital allocation in improving firm performance (Constantinides et al., 2003). Empirically, these results are consistent with previous studies such as Adesina et al. (2015), Kipesha and James (2014), and Garr and Awadzie (2023), which find that stronger capital structures contribute positively to bank profitability.

In contrast, the Debt-to-Equity Ratio (DER) produces mixed results across the estimation models. In the static panel models (CEM/PLS, FEM, and REM), DER shows a negative but statistically insignificant effect on profitability. However, in the dynamic panel estimation using the System GMM

model, DER has a positive and significant effect on ROA. These findings suggest that the impact of capital restructuring on bank profitability may depend on dynamic adjustments in capital structure over time. In the short run, higher leverage may increase financial risk and reduce profitability, which explains the insignificant results in static models. However, in the long run, an optimal balance between debt and equity may improve financial performance by increasing financial leverage and investment capacity. This result supports the trade-off theory, which suggests that firms balance the benefits of debt financing with the potential costs of financial distress (Constantinides et al., 2003).

The relationship between Non-Performing Loans (NPL) and profitability also produces interesting results. In several static panel models, NPL has a positive but insignificant effect on profitability. However, in the dynamic System GMM estimation, NPL shows a positive and significant relationship with ROA. This finding differs from many previous studies that generally report a negative relationship between credit risk and profitability. One possible explanation is that banks with higher lending activity may experience higher levels of NPL while simultaneously generating higher interest income from their loan portfolios. Therefore, the positive relationship may reflect increased credit expansion rather than improved credit quality. Previous studies such as Vinh (2017) and Bhattarai (2016) generally find that higher NPL reduces bank profitability, indicating that the relationship between credit risk and profitability may vary depending on institutional context and banking practices.

Overall, the dynamic panel estimation using the System GMM model provides the most comprehensive results, as all variables significantly influence bank profitability. The use of dynamic panel regression allows the model to capture adjustment processes and persistence in bank profitability over time. Dynamic models are particularly relevant in banking studies because bank performance is often influenced by past financial conditions and long-term structural adjustments (Hsiao, 2007; Clark & Linzer, 2015). Therefore, the System GMM estimation results may provide a more accurate representation of the relationship between capital restructuring and bank profitability.

Policy Implications and Recommendations

The findings of this study provide several important policy implications for the management of Indonesian state-owned banks and financial regulators. First, improving operational efficiency should be a priority for bank management. The consistently negative and significant effect of BOPO on profitability indicates that reducing operational costs relative to income can significantly improve financial performance. Bank management should therefore implement more efficient operational strategies, including digital banking transformation, cost management systems, and improved operational governance.

Second, maintaining adequate capital levels remains crucial for ensuring financial stability and improving bank profitability. The positive relationship between CAR and profitability suggests that well-capitalized banks are better positioned to manage financial risks and expand their lending activities. Therefore, regulators and bank management should ensure that capital adequacy levels remain above the regulatory minimum to strengthen banking sector resilience.

Third, the findings related to capital restructuring suggest that an optimal balance between debt and equity financing can enhance bank profitability in the long term. Bank management should carefully manage their capital structure to achieve an optimal leverage level that maximizes financial performance while minimizing financial risk.

Finally, credit risk management should remain a key priority for banking institutions. Although the results show mixed relationships between NPL and profitability, maintaining high credit quality is essential to ensure long-term banking stability. Banks should strengthen risk assessment mechanisms,

improve credit monitoring systems, and adopt prudent lending policies to minimize the potential impact of non-performing loans on financial performance.

6. Conclusion

This study examines the effect of capital restructuring on the profitability of Indonesian state-owned banks during the period 2019–2023. By employing both static and dynamic panel regression approaches, including the Common Effect Model (CEM/PLS), Fixed Effect Model (FEM), Random Effect Model (REM), Difference GMM, and System GMM, the study provides empirical evidence on the determinants of bank profitability.

The results show that operational efficiency, represented by BOPO, consistently has a negative and significant effect on bank profitability across all estimation models. This finding indicates that higher operating expenses relative to operating income significantly reduce the ability of banks to generate profits from their assets. Therefore, operational efficiency plays a crucial role in improving financial performance in the banking sector.

The results also indicate that capital restructuring variables produce mixed effects across estimation methods. The Capital Adequacy Ratio (CAR) shows a positive and significant effect on profitability in several models, suggesting that stronger capital adequacy enhances bank financial performance and stability. Meanwhile, the Debt-to-Equity Ratio (DER) shows a positive and significant effect on profitability only in the dynamic panel estimation using the System GMM model, indicating that capital restructuring may contribute to improved bank performance when dynamic adjustments in capital structure are considered.

The relationship between Non-Performing Loans (NPL) and profitability produces inconsistent results across estimation models. While NPL does not significantly influence profitability in the static panel models, the dynamic panel estimation shows a positive and significant relationship between NPL and profitability. This result suggests that the relationship between credit risk and bank profitability may depend on lending dynamics and banking practices.

Overall, the System GMM estimation provides the most comprehensive results among the models used in this study, as all explanatory variables significantly influence profitability. These findings highlight the importance of maintaining an optimal capital structure, improving operational efficiency, and strengthening risk management practices to enhance the financial performance of state-owned banks.

The study contributes to the literature by providing empirical evidence on the relationship between capital restructuring and profitability in Indonesian state-owned banks using both static and dynamic panel approaches. However, this study is limited by the relatively small sample size and the focus on only four state-owned banks. Future research may expand the dataset by including a larger number of banks or longer observation periods, as well as incorporating additional financial variables to provide a more comprehensive analysis of banking performance.

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