
**THE EFFECTS OF LOAN TO VALUE (LTV), MINIMUM RESERVE
REQUIREMENT (MRR), AND CAPITAL ADEQUACY RATIO (CAR) ON THE
PERFORMANCE OF STATE-OWNED BANKS**



Dimas Ananta¹
Universitas Negeri Medan, Medan, Indonesia
anantadimas3663@gmail.com

Muhammad Fitri Rahmadana²
Universitas Negeri Medan, Medan, Indonesia
mufitra@unimed.ac.id

Fitrawaty³
Universitas Negeri Medan, Medan, Indonesia
fitra53@gmail.com

Abstract

This study examines the impact of macroprudential policies on The Performance of State-Owned Banks in Indonesia, focusing on Loan to Value (LTV), Minimum Reserve Requirement (MRR), and Capital Adequacy Ratio (CAR). The research is motivated by the need to understand how macroprudential instruments influence the financial performance of major banks amid evolving credit, liquidity, and capital conditions. The problems addressed are whether LTV, MRR, and CAR individually and collectively affect Return on Equity (ROE), and which of these variables serve as the most influential determinants of profitability. The study aims to analyze the partial and simultaneous effects of these indicators on ROE using empirical data from four large Indonesian banks over the 2013–2023 period. The research employs a panel data regression approach using the fixed-effect model to estimate the relationships among variables. The empirical results show that LTV has a negative and significant effect on ROE, indicating that looser LTV policies tend to reduce profitability through increased credit risk. MRR has a positive but insignificant effect, suggesting that reserve requirements primarily function as liquidity buffers rather than direct profitability drivers. CAR exhibits a positive and significant effect, highlighting the importance of strong capitalization in supporting bank performance. Simultaneously, LTV, MRR, and CAR significantly influence ROE, with an R-squared value of 0.2723, meaning that 27.23% of the variation in profitability is explained by these macroprudential indicators. Overall, the findings underscore the essential role of integrated macroprudential policy in maintaining bank performance and financial stability.

Keywords: Loan To Value, Minimum Reserve Requirement, Capital Adequacy Ratio, Performance Bank

INTRODUCTION

The banking sector represents one of the fundamental pillars of the national financial system, holding a strategic role in stimulating economic growth. Through its intermediation function, banks mobilize public funds in the form of deposits and subsequently channel them as credit to productive sectors of the economy. This mechanism positions banks as a critical link between savings and investment, making them central actors in the financing of development. The continuity and stability of the banking system, therefore, play a key role in ensuring the effectiveness of overall financial activity. In practice, bank performance is closely shaped by macroeconomic conditions, financial system stability, and the regulatory and monetary policies implemented by financial authorities.

As financial intermediaries, banks are expected to support economic development by efficiently reallocating funds from surplus units to those requiring financing for productive activities. To carry out this role effectively, the banking industry must maintain stability, sound liquidity management, and operational efficiency. These factors have become increasingly important amid persistent global and domestic economic uncertainties. Consequently, the resilience and performance of the banking sector remain central considerations in national economic policymaking.

Within this framework, state-owned banks—Bank Mandiri, BRI, BNI, and BTN—serve as the backbone of Indonesia's financial system due to their dominant market share and substantial contribution to national credit distribution. These institutions not only drive lending to key productive sectors but are also expected to uphold financial stability through prudent and sustainable intermediation practices. The performance of state-owned banks thus provides a strong indication of the health and direction of the broader banking industry in Indonesia.

Bank performance itself is a vital indicator of the effectiveness and efficiency with which financial institutions manage their intermediation role. A well-performing bank demonstrates the ability to allocate credit efficiently, manage liquidity prudently, and mitigate risks in a dynamic economic environment. Elements such as operational efficiency, asset quality, and credit expansion are central to assessing financial soundness. Profitability indicators, particularly Return on Equity (ROE), are often used to evaluate how effectively a bank generates returns relative to shareholders' capital and are therefore widely adopted as measures of bank performance in empirical studies.

REVIEW OF LITERATURE

Macroprudential policy, as defined by Bank Indonesia, is a framework designed to preserve the stability of the financial system as a whole. The primary objective of this policy is to prevent and mitigate systemic risks, promote a balanced and high-quality intermediation process, and enhance financial system efficiency and access. Unlike monetary policy, which focuses on price stability and economic growth, macroprudential policy adopts a system-wide perspective that aims to address vulnerabilities arising within the financial sector. According to Bank Indonesia Regulation No. 16/11/PBI/2014, macroprudential oversight encompasses measures intended to reduce systemic imbalances, strengthen financial intermediation, and support broader financial sector development.

The conceptual foundation of macroprudential policy is further elaborated by Ismail & Indrawati, (2020), who argue that this policy approach emerged in response to the 2008

global financial crisis, which demonstrated that stable inflation and steady economic growth were insufficient to prevent financial system disruptions. Macroprudential policy operates in a top-down manner and focuses on systemic risks such as excessive credit expansion, asset price bubbles, and increasing exposure to global shocks. In practice, this policy complements both monetary and microprudential policies by employing forward-looking instruments such as liquidity buffers, countercyclical capital buffers, and credit regulation mechanisms aligned with the economic cycle. Through this integrated approach, macroprudential policy contributes to a more resilient financial system capable of sustaining healthy intermediation and long-term economic growth.

Loan to Value (LTV)

Loan to Value (LTV), or Financing to Value (FTV) in Islamic banking, is defined by Bank Indonesia as the ratio between the value of credit extended by a bank and the market value of the underlying property at the time of loan approval. This ratio serves as a key instrument in managing property-backed lending and is applicable to both conventional and Islamic banks. LTV is closely associated with credit allocation behavior, as it influences banks' willingness to extend mortgage-related financing (Nararya & Aji, 2024).

Bank Indonesia's Circular Letter No. 15/40/DKMP (2013) identifies LTV as one of the core macroprudential tools used to regulate mortgage lending and consumption loans secured by property. By setting limits on the proportion of financing relative to collateral value, the LTV ratio plays an important role in mitigating credit risk, restraining speculative activities in the property market, and maintaining financial system stability.

Minimum Reserve Requirement (MRR)

The Minimum Reserve Requirement, known in Indonesia as Giro Wajib Minimum (GWM) refers to the minimum amount of funds that banks must hold in their demand deposit accounts at Bank Indonesia. As noted by the Financial Services Authority (OJK) in Yunita, (2022), the reserve requirement is determined as a proportion of third-party funds collected by banks. Bank Indonesia classifies GWM into three categories: (1) primary reserve requirement, comprising mandatory rupiah deposits held at the central bank; (2) secondary reserve requirement, consisting of liquid securities such as Bank Indonesia Certificates and government bonds; and (3) the Loan to Funding Ratio (LFR)-based reserve requirement, which links reserve obligations to banks' intermediation performance.

In 2016, Bank Indonesia introduced an averaging mechanism for GWM as part of monetary operational reform. This system provides banks with greater flexibility in managing liquidity, strengthens the intermediation process, and supports the development of domestic financial markets. GWM thus functions not only as a liquidity management tool but also as an instrument for maintaining financial system stability and supporting macroprudential objectives.

Capital Adequacy Ratio (CAR)

The Capital Adequacy Ratio (CAR) measures the proportion of a bank's capital to its risk-weighted assets (ATMR). As one of the primary indicators of capital adequacy, CAR reflects a bank's ability to absorb potential losses, support business expansion, and maintain financial resilience. According to Pandia, (2012), Bank Indonesia requires all banks to maintain a minimum capital ratio based on the total of on-balance-sheet and off-balance-sheet risk-weighted assets. Sufficient capital enables banks to withstand financial shocks, comply with regulatory requirements, and maintain stakeholder confidence.

Bank Performance

Bank performance represents the financial condition of a bank over a specific period, reflecting its capacity to mobilize and allocate funds efficiently. Jumingan, (2006) emphasizes that performance evaluation typically involves indicators such as capital adequacy, liquidity, and profitability. Financial performance also demonstrates how effectively a bank manages assets, generates income, controls expenses, and handles inherent risks. Bank performance assessment relies primarily on financial statement analysis, supported by external factors such as market conditions, industry trends, and managerial capability (Herlina et al., 2024). As noted by Runa et al., (2025), financial performance integrates historical, current, and projected information, with ratio analysis serving as a key measurement tool.

In this study, bank performance is represented by profitability and risk indicators, specifically Return on Equity (ROE) and Non-Performing Loans (NPL), following previous research by (Regina & Hardi, 2016). ROE is widely recognized as a core profitability measure that evaluates the bank's ability to generate net income from shareholders' equity. A higher ROE indicates stronger financial performance, greater value creation for shareholders, and potentially improved capital structure, which may subsequently influence other financial ratios such as CAR (Kasmir, 2014); (Dewi et al., 2024). ROE is therefore an essential metric for understanding managerial effectiveness in utilizing bank capital to generate earnings.

RESEARCH METHOD

This study was conducted in Indonesia with a focus on state-owned commercial banks operating at the national level, namely Bank Mandiri, Bank Negara Indonesia (BNI), Bank Rakyat Indonesia (BRI), and Bank Tabungan Negara (BTN). These banks were selected because they represent major financial institutions under direct government supervision and play a strategic role in the national financial system. The application of macroprudential instruments such as the Loan to Value ratio (LTV), the Minimum Reserve Requirement (MRR), and the Capital Adequacy Ratio (CAR) is implemented uniformly across the banking sector; therefore, examining state-owned banks provides a relevant and comprehensive overview of how such policies affect bank performance. The research commenced in March 2025 and continued until the completion of all analytical stages.

This study employs quantitative data, which consist of numerical values that can be processed statistically. The research scope includes state-owned banks registered and supervised by the Financial Services Authority (OJK). The time horizon spans eleven years, from 2013 to 2023, allowing the analysis to capture the dynamics of macroprudential policy implementation during a period marked by post-crisis financial stabilization and the lead-up to the COVID-19 pandemic. By examining a decade-long period, the study aims to provide a more robust assessment of how LTV, MRR, and CAR influence bank performance over the medium and long term.

The data used in this research are secondary data obtained from official sources, including Bank Indonesia, the Financial Services Authority (OJK), and the annual financial statements of each bank under study. Following Sugiyono, (2019), secondary data refers to information collected from existing sources rather than directly from respondents. The study uses panel data, which combine cross-sectional and time-series dimensions, thereby allowing

more comprehensive and reliable analysis. The total number of observations is forty-four, derived from four banks observed over eleven years.

The variables examined in this study consist of macroprudential policy indicators and bank performance. The independent variables include the Loan to Value ratio (LTV), the Minimum Reserve Requirement (MRR), and the Capital Adequacy Ratio (CAR). Bank performance serves as the dependent variable and is measured using Return on Equity (ROE), which reflects the bank’s ability to generate net income from shareholders’ equity. ROE is widely regarded as a comprehensive indicator of profitability and is therefore used to capture the effectiveness of bank management in deploying financial resources.

RESULTS AND DISCUSSION

Panel Data Regression Results

1. Model Selection

The study employed three panel regression approaches: Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). Model selection was conducted through the following tests:

a. Chow Test

**Table 1.
 Chow Test**

Effect Test	Statistic	d.f.	Prob.
Cross-section F	4.105148	(3,36)	0.0133
Cross-section Chi-square	12.946223	3	0.0048

Source: Output EViews, 2025

Prob. Chi-Square = 0.0048 < 0.05 → FEM is preferred over CEM.

b. Hausman Test

**Table 2.
 Hausman Test**

Test the cross-sectional random effect			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	3	1.0000

Source: Output EViews, 2025

Prob. Random = 1.000 > 0.05 → REM is preferred over FEM.

c. Lagrange Multiplier Test

**Table 3.
 Lagrange Multiple Test**

Lagrange Multiplier Test for Random Effects

Null hypotheses: No effects

Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives

Cross-section	Test Hypothesis Time	Both
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Breusch Pagan	1.818115 (0.1775)	2.547359 (0.1105)	4.365474 (0.0367)
Honda	1.348375 (0.0888)	1.596045 (0.0552)	2.082019 (0.0187)
King-Wu	1.348375 (0.0888)	1.596045 (0.0552)	1.949318 (0.0256)
Standardized Honda	2.935458 (0.0017)	2.082384 (0.0187)	-0.192106 (0.5762)
Standardized King-Wu	2.935458 (0.0017)	2.082384 (0.0187)	0.141356 (0.4438)
Gourieroux, et al.	--	--	4.365474 (0.0465)

Source: Output eviews, 2025

Prob. Breusch-Pagan = 0.1775 > 0.05 → CEM is preferred over REM.

Final model used: Common Effect Model (CEM).

2. Classical Assumption Tests

a. Multicollinearity Test

Table 4.
Multicollinearity Test

	X1	X2	X3
X1	1	0.234706269	0.710322813
X2	0.234706269	1	0.147931943
X3	0.710322813	0.147931943	1

Source: Output eviews, 2025

Correlation among LTV, MRR, and CAR < 0.85 → No multicollinearity detected.

b. Heteroskedasticity Test

Table 5.
Heteroskedasticity Test

Dependent Variable: ABS(RESID)

Method: Panel Least Squares

Date: 08/25/25 Time: 21:03

Sample: 2013 2023

Periods Included: 11

Total panel (balanced) observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.120206	5.380134	0.579949	0.5652
X1	-0.804638	2.230924	-0.360675	0.7202
X2	-0.029653	0.053987	-0.549256	0.5859
X3	0.107941	0.326055	0.331051	0.7423

Source: Output EViews, 2025

All variables have probability values > 0.05 → No heteroskedasticity detected.

Thus, the model satisfies the classical assumptions and is feasible for estimation.

3. CEM Estimation Results

Based on the results of the Chow test, Hausman test, and Lagrange Multiplier test that have been conducted, the best panel data regression model estimation selected is the Common Effect Model (CEM). The results of the CEM hypothesis testing are as follows:

Table 6.
CEM

Dependent Variable: Y1
 Method: Panel Least Squares
 Date: 08/25/25 Time: 21:11
 Sample: 2013 2023
 Periods Included: 11
 Cross-sections included: 4
 Total panel (balanced) observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.407298	8.066082	0.794351	0.4317
X1	-12.66941	3.344677	-3.787931	0.0005
X2	0.078694	0.080939	0.972270	0.3368
X3	1.032466	0.488833	2.113104	0.0410

Source: Output EViews, 2025

Based on Table 6, the EViews output results for the coefficient of each research variable are known, allowing the formation of the following analysis model equation:

$$ROE_{it} = \alpha + \beta_1 LTV_{it} + \beta_2 MRR_{it} + \beta_3 CAR_{it} + \varepsilon_{it}$$

$$ROE_{it} = 6,407 - 12,669LTV_{it} + 0,078 MRR_{it} + 1,032 CAR_{it} + \varepsilon_{it}$$

Interpretation of the Regression Model:

- Constant ($\alpha = 6.407$). The constant indicates the average ROE when all independent variables (LTV, MRR, CAR) are assumed to be zero. Although statistically insignificant, it provides a baseline level of bank profitability in the absence of macroprudential influence, estimated at 6.41%.
- Loan to Value (LTV). The coefficient of -12.669 shows that a one-unit increase in LTV reduces ROE by 12.669%, holding other variables constant. This suggests that more relaxed LTV policies may elevate credit risk and weaken profitability, whereas stricter LTV rules can enhance financial stability and support higher efficiency, thereby mitigating downward pressure on ROE.
- Minimum Reserve Requirement (MRR). The coefficient of 0.078 indicates a very small positive effect on ROE. This implies that a 1% increase in MRR slightly raises ROE, assuming other variables are constant. Because higher reserve requirements limit the liquidity available for lending, the modest positive impact suggests that banks with stronger liquidity management remain capable of sustaining profitability even as reserve requirements rise.
- Capital Adequacy Ratio (CAR). The coefficient of 1.032 implies that a 1% increase in CAR enhances ROE by 1.032%. Stronger capital positions improve banks' ability to absorb credit and operational risks, strengthen customer and investor confidence, and

provide room for business expansion. These conditions collectively support higher profitability.

Hypothesis Test

a. t-Test

The t-test is used to examine the partial effect of each independent variable on ROE. Based on Table 6, the following results are obtained:

Loan to Value (LTV)

The t-value for LTV is -3.78 , greater in absolute terms than the t-table value of 2.021 , with a significance level of $0.0005 < 0.05$. Thus, H_0 is rejected, indicating that LTV has a negative and significant effect on ROE. From an economic perspective, the negative effect of LTV on ROE can be explained through several mechanisms. When LTV standards are relaxed, banks tend to extend credit to borrowers with lower initial equity, increasing the likelihood of default. This is consistent with the results of the NPL model, which shows that LTV has a positive and significant effect on NPLs. Higher NPLs require banks to increase loan loss provisions, which directly reduces net income and ultimately lowers ROE. Relaxed LTV requirements may also create adverse selection and moral hazard. Under looser credit standards, higher-risk borrowers are more likely to seek loans (adverse selection), while borrowers with a smaller personal capital stake may have weaker incentives to maintain repayment discipline (moral hazard). Both conditions heighten overall credit risk.

In addition, LTV relaxation often intensifies competition among banks to expand their credit portfolios. To attract borrowers, banks may reduce lending rates or narrow profit margins. When credit risk rises while margins decline, the bank's net interest margin becomes squeezed, reducing net income and ROE. Greater exposure to risky assets may also require banks to hold more capital, increasing the cost of capital and further depressing shareholder returns. These findings align with previous studies. Afrianty et al., (2024) notes that LTV relaxation can accelerate credit growth but also raises systemic risk, ultimately weakening bank stability and profitability. Regina & Hardi, (2016) similarly finds that stricter LTV policies help maintain asset quality and support long-term financial performance. Overall, the results reinforce the literature highlighting the importance of macroprudential tools such as LTV in balancing credit growth with financial stability.

Minimum Reserve Requirement (MRR)

The t-value for MRR is 0.97 , which is lower than the t-table value of 2.021 , and the significance level of $0.33 > 0.05$. Therefore, H_0 is accepted, meaning that MRR does not have a significant effect on ROE. The positive coefficient of 0.078694 indicates that a 1% increase in MRR, ceteris paribus, raises ROE by only 0.078694% . However, this effect is too small to generate a meaningful impact on bank profitability. Since MRR represents mandatory reserves held at Bank Indonesia, it cannot be used for productive activities. Thus, an increase in MRR primarily supports liquidity rather than boosting income.

This finding aligns with liquidity management theory, which states that higher reserve requirements reduce banks' flexibility in extending credit and may restrain profit growth. Therefore, despite the positive direction, higher MRR does not necessarily enhance short-term profitability. The result is consistent with Dwiwiyanto et al., (2009), who found that GWM has a positive but insignificant effect on profitability in Indonesian commercial banks. This suggests that MRR functions more as a liquidity and stability tool rather than a direct

driver of financial performance. Banks with strong liquidity management can maintain ROE despite changes in MRR, making its fluctuations less influential on profitability.

Overall, the evidence indicates that during the study period, factors such as operational efficiency, asset quality, and lending strategy played a more dominant role in shaping ROE compared to the reserve requirements set by the monetary authority.

Capital Adequacy Ratio (CAR)

The t-value for CAR is 2.11, slightly higher than the t-table value of 2.021, with a significance level of $0.04 < 0.05$. Accordingly, H_0 is rejected, showing that CAR has a significant positive effect on ROE. Based on the regression results, the Capital Adequacy Ratio (CAR) has a positive coefficient of 1.032466 with a t-statistic of 2.112104 and a p-value of 0.0410. Since the p-value is below the 0.05 significance level, CAR is shown to have a positive and significant effect on ROE in the four banks observed during 2013–2023. This indicates that higher CAR enhances the bank's ability to generate profitability.

The coefficient implies that a 1% increase in CAR, *ceteris paribus*, raises ROE by 1.032466%. This reflects the critical role of capital in supporting operations, business expansion, and productive lending. Strong capital also strengthens customer and investor confidence, thereby contributing to improved financial performance. This finding aligns with banking theory, which states that adequate capital enables banks to absorb losses, expand credit portfolios, and reduce insolvency risk. Greater capital allows banks to extend financing, optimize investments, and stabilize earnings, all of which contribute to higher ROE.

The results are consistent with Dwiwiyanto et al., (2009), who found that CAR positively and significantly influences ROE in Indonesian commercial banks. They also support Basel Committee regulations, which set a minimum CAR of 8% to ensure bank soundness. The banks in this study consistently maintained CAR levels above the regulatory threshold, giving them sufficient room to enhance profitability. Overall, the results highlight that optimal capital management is essential for improving financial performance. Stronger capitalization increases banks' resilience and capacity for business expansion, ultimately boosting ROE. The significant positive relationship between CAR and ROE underscores capital as a key driver of sustainable profitability.

b. F-Test

Table 7
F-Test and R-Squared

R-squared	0.272345
Adjusted R-Squared	0.217771
S.E. of regression	5.917759
Sum squared resid	1400.795
Log likelihood	-138.5666
F-statistic	4.990361
Prob(F-statistic)	0.004926

Source: Output EViews, 2025

Based on the simultaneous F-test results, the calculated F-value is 4.99, which is greater than the F-table value of 2.84 at a 5% significance level. The significance value of $0.0049 < 0.05$ also confirms statistical significance. Therefore, H_0 is rejected, indicating that

LTV, MRR, and CAR jointly have a significant effect on ROE. This means the regression model is appropriate for explaining variations in ROE based on the three macroprudential indicators.

c. Coefficient of Determination (R^2)

The R-squared value of 0.2723 indicates that 27.23% of the variation in ROE is explained by LTV, MRR, and CAR included in the model. Meanwhile, the remaining 72.77% is influenced by factors outside the model, such as credit quality, macroeconomic conditions, operational efficiency, inflation, interest rates, and other external or bank-specific variables. A comprehensive management strategy across these variables can thus help banks enhance ROE in a sustainable manner.

CONCLUSION

Based on the results of this study, which examined the effect of macroprudential policies represented by Loan to Value (LTV), Minimum Reserve Requirement (MRR), and Capital Adequacy Ratio (CAR) on the Return on Equity (ROE) of four major state-owned banks in Indonesia during the period 2013–2023, several conclusions can be drawn. First, LTV is found to have a negative and significant effect on ROE. This indicates that a higher LTV ratio tends to reduce bank profitability. A more relaxed LTV policy may stimulate excessive credit expansion, raising credit risk and lowering the return on equity. This finding aligns with macroprudential policy theory, which emphasizes the role of LTV tightening in maintaining asset quality and safeguarding financial stability. Second, MRR shows a positive but insignificant effect on ROE. Changes in MRR do not substantially influence bank profitability, as this instrument primarily functions to regulate short-term liquidity rather than directly affecting bank earnings or capital returns. Third, CAR has a positive and significant impact on ROE. A higher capital adequacy ratio strengthens a bank's capacity to absorb losses and support productive lending, which ultimately enhances profitability. This underscores the importance of strong capitalization in sustaining sound financial performance.

Fourth, LTV, MRR, and CAR collectively contribute a significant simultaneous effect on ROE. The model's Prob(F-statistic) of 0.004926 (< 0.05) confirms that the three macroprudential indicators jointly influence bank profitability. The R-squared value of 0.2723 suggests that 27.23% of the variation in ROE is explained by these variables, while the remaining portion is influenced by other factors such as interest rates, inflation, and broader economic conditions. Overall, the study demonstrates that an integrated macroprudential policy framework is essential for supporting bank performance and maintaining financial system stability. LTV plays a key role in controlling credit risk, CAR contributes to strengthening profitability, and MRR complements liquidity management. Therefore, a coordinated approach to credit, liquidity, and capital-based instruments is crucial for promoting sustainable economic growth and ensuring a resilient banking sector.

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