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Credit, Liquidity, and Pandemic Shock Effects on Indonesian Banking Profitability: An ARDL Evidence from 2010–2025

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Abstract
Purpose: This study examines the determinants of banking profitability in Indonesia by analyzing the effects of credit distribution, capital adequacy, liquidity, monetary policy rates, and the COVID-19 shock using a dynamic time-series framework.
Research Methodology: Monthly data from January 2010 to June 2025 are analyzed using the Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) approaches. HAC/Newey-West robust standard errors are employed to improve estimation reliability.
Results: The findings confirm a long-run relationship among the variables. Credit distribution exhibits dynamic effects on profitability, while liquidity significantly affects profitability in both the short and long run. The COVID-19 variable negatively affects banking profitability, whereas capital adequacy and monetary policy rates are statistically insignificant. The ECM results indicate gradual adjustment toward long-run equilibrium.
Conclusions: Banking profitability in Indonesia is primarily influenced by liquidity conditions, credit adjustment mechanisms, and external shocks rather than capital adequacy or monetary policy rates.
Limitations: This study uses aggregate banking industry data and limited explanatory variables.
Contributions: This study contributes to the banking literature by providing dynamic evidence using high-frequency monthly data and an ARDL-ECM framework incorporating structural pandemic shocks.

Keywords: *ARDL Model; Banking Performance; Credit Distribution; Liquidity; Monetary Policy*

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1. Introduction

The banking sector plays a crucial role in supporting economic growth through financial intermediation, particularly in developing countries such as Indonesia. Banks function as intermediary institutions that channel funds from surplus units to deficit units, thereby facilitating investment, consumption, and overall economic activity. Consequently, maintaining banking sector performance is essential for

ensuring financial system stability, sustaining economic growth, and strengthening public confidence in the financial system (Athanasoglou et al., 2008; Beck et al., 2010).

In Indonesia, banking sector performance has experienced substantial fluctuations over the past decade, particularly during the COVID-19 pandemic period. According to data published in *Statistik Perbankan Indonesia* by the Financial Services Authority (OJK), the profitability of Indonesian commercial banks, as measured by Return on Assets (ROA), remained relatively stable before the pandemic, reaching approximately 2.47% in 2019. However, banking profitability declined significantly during the COVID-19 period due to slowing credit growth, increasing credit restructuring, and rising credit risk exposure. In 2020, ROA decreased to around 1.59%, reflecting weakened banking performance amid economic uncertainty and declining lending activities. Following the post-pandemic recovery period, banking profitability gradually improved alongside stronger credit expansion and improving macroeconomic conditions. By the first half of 2025, ROA had continued to increase, indicating relatively strong resilience within the Indonesian banking sector after the pandemic shock (Otoritas Jasa Keuangan (OJK, 2025).

At the same time, Indonesian banking intermediation also experienced substantial changes during the observation period. Credit growth remained relatively high before the pandemic, reaching above 20% during 2011–2013, but gradually weakened after 2014 due to slower economic activity and tighter financial conditions. During the COVID-19 pandemic, banking credit growth contracted by approximately -2.40% in 2020 as lending demand weakened and banks became more cautious in extending loans. Following economic recovery, credit growth gradually improved and returned to double-digit levels after 2022, indicating the recovery of banking intermediation functions and economic activities. In addition, Bank Indonesia implemented accommodative monetary policies through lower policy interest rates to support economic recovery and maintain financial system stability. These developments indicate that banking profitability in Indonesia is dynamically influenced by lending activities, liquidity conditions, monetary policy, and external economic shocks.

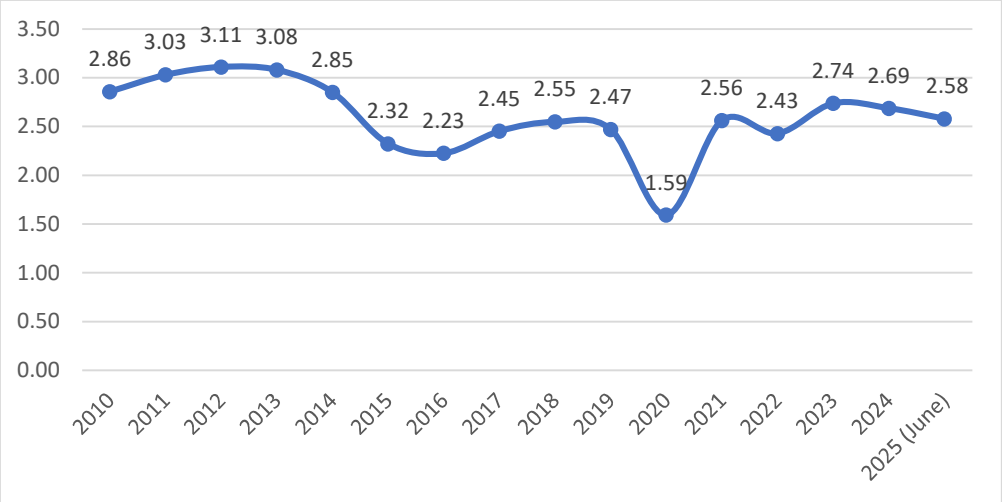

Figure 1. Trend of Indonesian Banking ROA Before, During, and After COVID-19
Source: Statistik Perbankan Indonesia (SPI), Otoritas Jasa Keuangan (OJK), processed data.

Figure 1 illustrates that Indonesian banking profitability remained relatively stable before the COVID-19 pandemic but declined sharply during 2020 due to economic disruptions, rising credit risk, and weakening lending activities. Following the pandemic period, banking profitability gradually recovered alongside improving macroeconomic conditions and banking sector resilience. Meanwhile, Figure 2 shows that banking credit growth experienced a substantial slowdown during the pandemic period before recovering after 2022. These patterns indicate that Indonesian banking performance is characterized by dynamic adjustments and is highly sensitive to macroeconomic shocks and changes in financial intermediation activities.

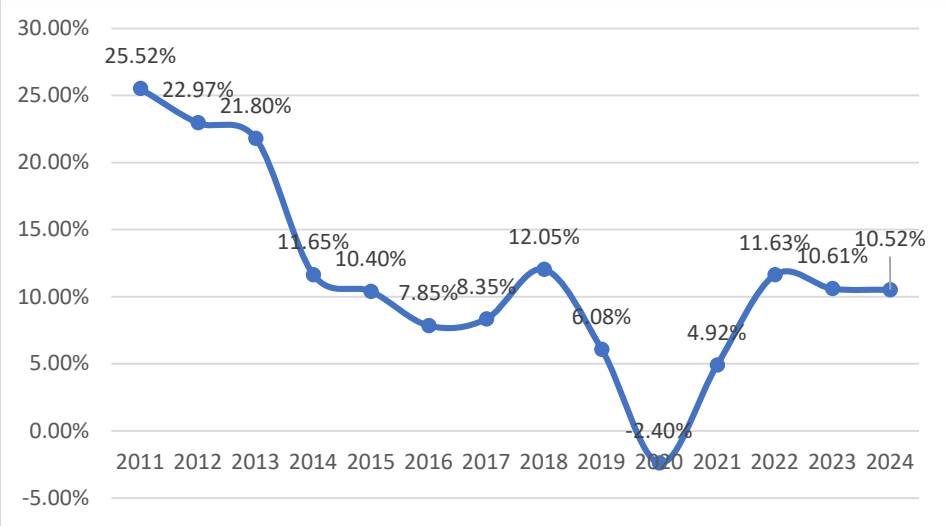

Figure 2. Trend of Indonesian Banking Credit Growth (2011–2024)
Source: Statistik Perbankan Indonesia (SPI), Otoritas Jasa Keuangan (OJK), processed data.

The COVID-19 pandemic, in particular, created significant disruptions in banking activities by increasing credit risk, reducing lending demand, and exerting pressure on bank profitability. Previous studies confirm that the pandemic weakened banking performance globally and exposed structural vulnerabilities within financial systems (Demirguc-Kunt et al., 2021; Elnahass et al., 2021). In response, Indonesian banking authorities introduced various policy measures, including credit restructuring programs, liquidity expansion, and accommodative monetary policies to stabilize the banking system and maintain financial intermediation.

Previous literature generally identifies two broad categories of determinants affecting banking performance, namely internal banking factors and external macroeconomic factors. Internal factors include credit distribution, capital adequacy, and liquidity management, while external factors include monetary policy, interest rates, and macroeconomic shocks. (Athanasoglou et al., 2008) emphasize the importance of bank-specific characteristics in explaining profitability, whereas (Beck et al., 2010) highlight the role of lending activities in supporting financial intermediation and profitability. More recent studies further suggest that banking performance is increasingly shaped by dynamic adjustments, macro-financial linkages, and external uncertainty (Borio et al., 2017; Mies, 2024).

2 Despite the growing literature on banking profitability, several important gaps remain unresolved. First, most previous studies rely on annual or panel data, which may not adequately capture short-term fluctuations and rapid adjustments in banking activities. Consequently, the dynamic behavior of banking profitability, particularly in response to changes in lending activities and liquidity conditions, remains insufficiently explored. Second, although many studies examine internal banking determinants and macroeconomic factors, these variables are often analyzed separately rather than within an integrated dynamic framework. Third, relatively limited studies explicitly incorporate structural shocks such as the COVID-19 pandemic using high-frequency time-series data in the Indonesian banking context. As a result, the short-run and long-run adjustment mechanisms of banking profitability during periods of economic disruption remain underexplored. Recent studies argue that high-frequency analysis is essential for understanding rapid changes in financial systems, monetary transmission mechanisms, and banking resilience during crisis periods (Aysan et al., 2022; Demirguc-Kunt et al., 2021).

2 To address these gaps, this study employs monthly time-series data from January 2010 to June 2025 and applies the Autoregressive Distributed Lag (ARDL) approach developed by (Pesaran et al., 2001). The ARDL model is particularly appropriate because it enables the estimation of both short-run and long-run relationships while accommodating variables integrated at different orders, namely I(0) and I(1). The study focuses on the dynamic effects of credit distribution, capital adequacy, liquidity, interest rates, and the COVID-19 shock on Indonesian banking profitability.

This study contributes to the banking and financial literature in several ways. First, it provides a dynamic analysis of Indonesian banking profitability using high-frequency monthly data, thereby offering deeper insights into short-term banking adjustments. Second, it integrates internal banking variables and macroeconomic conditions within a unified empirical framework to explain banking profitability dynamics more comprehensively. Third, this study explicitly captures the impact of structural shocks, particularly the COVID-19 pandemic, on banking profitability in both the short run and long run. The findings are expected to provide important implications for policymakers, financial regulators, and banking practitioners in strengthening banking sector resilience and maintaining financial system stability in Indonesia.

2. Literature Review and Hypothesis/es Development

2.1. Banking Performance and Financial Intermediation Theory

Banking performance generally reflects a bank's ability to generate profits efficiently while maintaining financial stability and supporting financial intermediation activities. In banking studies, profitability is commonly measured using Return on Assets (ROA), which indicates the efficiency of banks in utilizing their assets to generate earnings. According to bank profitability theory, banking performance is influenced by internal operational efficiency, risk management, capital strength, liquidity conditions, and external macroeconomic factors (Athanasoglou et al., 2008; Dietrich & Wanzenried, 2011).

This study is primarily grounded in financial intermediation theory, which explains that banks function as intermediary institutions that collect funds from surplus units and channel them to deficit units through lending activities. Through this intermediation process, banks generate profits mainly from interest income and financial services (Beck et al., 2010). Consequently, banking profitability is strongly associated with lending activities, liquidity management, capital adequacy, and macroeconomic conditions affecting financial intermediation.

In addition, bank profitability theory emphasizes the importance of balancing profitability, liquidity, and risk management in maintaining sustainable banking performance. Effective allocation of assets and liabilities enables banks to maximize profitability while maintaining financial stability (Menicucci & Paolucci, 2016). Furthermore, the monetary transmission channel theory explains that monetary policy influences banking activities through changes in interest rates, lending behavior, funding costs, and credit demand, thereby affecting bank profitability and financial intermediation efficiency (Borio et al., 2017).

Previous studies confirm that banking profitability is influenced by both internal and external determinants. (Athanasoglou et al., 2008; Petria et al., 2015) find that bank-specific factors, industry conditions, and macroeconomic variables jointly affect banking profitability. Similarly, (Nguyen, 2020) argues that banking performance is shaped by liquidity conditions, operational efficiency, and macroeconomic dynamics. More recent studies also suggest that banking profitability increasingly reflects dynamic adjustments to economic uncertainty and external shocks (Mies, 2024).

2.2. Credit Distribution and Banking Performance

Financial intermediation theory suggests that lending activities represent the primary source of banking income through interest earnings and financial intermediation services. Higher credit distribution generally increases bank profitability because loans constitute productive earning assets that generate interest income over time (Beck et al., 2010). Similarly, (Athanasoglou et al., 2008; Tan, 2016) argue that loan expansion positively contributes to bank profitability by increasing net interest margins and improving financial intermediation efficiency.

However, the relationship between lending activities and profitability may exhibit dynamic behavior, particularly in the short run. Aggressive loan expansion may initially increase operational costs, monitoring expenses, and credit risk exposure before generating positive returns. (Rahman et al., 2015) explain that lending activities may reduce profitability in the short term due to higher credit risk and administrative costs, although positive effects generally emerge over time as loans become productive assets.

Therefore, this study expects that credit distribution positively affects banking profitability in the long run, although short-run effects may initially be negative due to adjustment costs and credit risk exposure.

H_1: Credit distribution has a positive long-run effect on banking performance, although short-run effects may initially be negative due to adjustment costs and credit risk exposure.

2.3. Capital Adequacy and Banking Performance

Bank profitability theory emphasizes that capital adequacy plays an important role in maintaining banking stability and supporting sustainable profitability. The Capital Adequacy Ratio (CAR) reflects a bank's ability to absorb potential losses and maintain solvency under financial stress conditions. Well-capitalized banks are generally considered more stable, less risky, and better able to sustain lending activities during economic uncertainty (Berger, 1995).

Empirical studies also confirm the positive relationship between capital strength and banking profitability. (Lee & Hsieh, 2013) find that higher capital adequacy improves banking stability and reduces financial risk, thereby supporting profitability. Similarly, (Berger & Bouwman, 2013) argue that stronger capital positions enhance banking resilience during financial crises.

However, when banking systems already maintain high capital buffers above regulatory requirements, the marginal contribution of additional capital to profitability may become relatively limited. This condition is particularly relevant in stable banking systems where banks consistently maintain capital adequacy above minimum regulatory standards.

Therefore, this study expects capital adequacy to positively affect banking profitability.

H_2: Capital adequacy has a positive effect on banking performance.

2.4. Liquidity and Banking Performance

Liquidity management is an essential component of banking operations because banks must maintain sufficient liquidity while simultaneously maximizing profitability. According to bank profitability theory, liquidity enables banks to support lending activities, fulfill short-term obligations, and maintain operational stability. However, excessive liquidity may reduce profitability because idle funds generate lower returns compared to productive earning assets.

The Loan to Asset Ratio (LAR) reflects the extent to which banks allocate their assets into loans. Higher liquidity utilization through lending activities may increase profitability because loans generate interest income. Nevertheless, liquidity effects may not occur immediately because the process of transforming liquid assets into productive loans requires time and adjustment.

Previous studies demonstrate that liquidity influences banking profitability through dynamic adjustments. (Louzis et al., 2012) argue that liquidity conditions affect banking performance with lagged effects due to delayed loan realization and asset utilization processes. Similarly, (Nguyen, 2020) finds that liquidity management significantly affects bank profitability, particularly in emerging banking markets.

Therefore, this study expects liquidity to positively affect banking profitability through dynamic adjustment mechanisms over time.

H_3: Liquidity significantly affects banking performance through dynamic adjustments over time.

2.5. Monetary Policy Rate and Banking Performance

The monetary transmission channel theory explains that policy interest rates influence banking activities through lending rates, funding costs, credit demand, and net interest margins. Changes in monetary policy rates affect banking profitability depending on the effectiveness of monetary transmission mechanisms and banking market conditions (Borio et al., 2017).

In the Indonesian context, the policy interest rate experienced an institutional transition in 2016. Prior to August 2016, Bank Indonesia used the BI-Rate as the benchmark policy rate. Since August 2016, the BI 7-Day Reverse Repo Rate (BI7DRR) has become the primary monetary policy instrument. In this

study, the policy interest rate variable is treated as a continuous monetary policy indicator representing Bank Indonesia's benchmark interest rate throughout the observation period.

Previous studies indicate that lower interest rates may reduce bank profitability by compressing interest margins, while higher rates may increase funding costs and credit risk exposure (Claessens et al., 2018). However, the effect of policy rates on profitability may vary depending on banking structures, liquidity conditions, and macroeconomic environments.

Therefore, this study expects policy interest rates to negatively affect banking profitability.

H_4: Policy interest rates negatively affect banking performance.

2.6. COVID-19 Pandemic and Banking Performance

The COVID-19 pandemic represents a major external shock that significantly disrupted economic activities and financial systems worldwide. The pandemic weakened banking performance by increasing credit risk, reducing lending demand, and slowing economic activity (Demirguc-Kunt et al., 2021). In Indonesia, banking profitability also declined during the pandemic period due to rising loan restructuring and weakening financial intermediation activities.

This study incorporates a dummy variable representing the COVID-19 pandemic period from January 2020 to December 2021. This period reflects the peak phase of economic disruption, mobility restrictions, aggressive credit restructuring policies, and heightened uncertainty in the Indonesian economy. During this period, banking activities experienced substantial pressure due to declining economic performance and weakening credit demand.

Previous studies confirm that the pandemic negatively affected banking profitability and financial stability globally (Ashraf, 2020; Elnahass et al., 2021). Therefore, the COVID-19 shock is expected to negatively influence banking profitability in Indonesia.

H_5: The COVID-19 pandemic negatively affects banking performance.

Nevertheless, future studies may perform robustness testing using alternative pandemic periods, including 2020–2021, to capture prolonged restructuring effects and post-pandemic banking adjustments.

Despite the growing literature on banking profitability, several important gaps remain unresolved. First, most previous studies rely on annual or panel data, which may not adequately capture short-term fluctuations and rapid adjustments in banking activities. Second, prior studies often analyze internal banking factors and macroeconomic conditions separately rather than within an integrated dynamic framework. Third, relatively limited studies explicitly incorporate structural shocks such as the COVID-19 pandemic using high-frequency time-series data in the Indonesian banking context. Therefore, this study addresses these gaps by employing monthly data from 2010 to 2025 and applying a dynamic ARDL framework to simultaneously examine internal banking factors, monetary policy, and pandemic shocks affecting Indonesian banking profitability.

3. Methodology

3.1. Research Design

This study is classified as a non-experimental quantitative time-series study using secondary data. The research aims to analyze the determinants of banking performance in Indonesia through an econometric approach. The study employs the Autoregressive Distributed Lag (ARDL) model to examine both short-run and long-run relationships among variables. The ARDL approach is considered appropriate because it accommodates variables integrated at different orders, namely I(0) and I(1), and provides reliable estimates for time-series data with relatively limited observations (Pesaran et al., 2001).

3.2. Data and Sources

This study utilizes monthly time-series data from January 2010 to June 2025, resulting in approximately 186 observations. The data are secondary in nature and obtained from official institutions. Banking

variables, including Return on Assets (ROA), total loans, Capital Adequacy Ratio (CAR), and Loan to Asset Ratio (LAR), are sourced from the Financial Services Authority (OJK).

Macroeconomic variables are obtained from Bank Indonesia and the Central Statistics Agency (BPS), where the BI-Rate is used to represent monetary policy. In addition, a dummy variable is incorporated to capture the impact of the COVID-19 pandemic, taking a value of one during the pandemic period and zero otherwise.

All variables are aggregated at the national banking level and processed to ensure consistency in frequency and time alignment. Furthermore, the loan variable is transformed into a natural logarithmic form to improve data distribution and reduce potential heteroskedasticity.

3.3. Variables Measurement

The variables used in this study are defined based on established concepts in banking and financial literature. Banking performance is proxied by Return on Assets (ROA), which reflects the ability of banks to generate profit from total assets and is widely used as an indicator of financial performance. Credit distribution is represented by total loans (Loan), which is transformed into a natural logarithmic form (LogLoan) to improve data distribution, reduce heteroskedasticity, and ensure comparability across time.

Capital strength is measured using the Capital Adequacy Ratio (CAR), which indicates the bank's ability to absorb potential losses and maintain financial stability. Liquidity conditions are captured through the Loan to Asset Ratio (LAR), which reflects the proportion of loans relative to total assets and indicates how effectively banks allocate their resources into earning assets.

Macroeconomic conditions are represented by the policy interest rate proxied by the BI-Rate, which serve as key monetary policy instruments influencing banking activities. In addition, this study incorporates a dummy variable (Dummy) to capture the impact of the COVID-19 pandemic, where the value is set to one for the period from January 2020 to December 2021 and zero otherwise. The operational definitions and measurements of all variables are summarized in Table 1.

Table 1. Operational Definition of Variables

Variable	Definition	Measurement
ROA	Bank profitability indicator (Athanasoglou et al., 2008; Dietrich & Wanzenried, 2011).	Net Income / Total Assets (%)
LOAN	Credit distribution (Beck et al., 2010; Tan, 2016).	Total Loans (logarithmic form)
CAR	Capital strength of banks (Berger, 1995; Lee & Hsieh, 2013).	Capital / Risk-Weighted Assets (%)
LAR	Bank liquidity level (Louzis et al., 2012; Nguyen, 2020).	Total Loans / Total Assets (%)
BI-Rate	Monetary policy rate (Borio et al., 2017; Demirguc-Kunt et al., 2021).	BI-Rate (%)
DUMMY	COVID-19 impact (Demirguc-Kunt et al., 2021).	Dummy (1 = Jan 2020–Dec 2021, 0 otherwise)

This study employs a unified monetary policy rate series obtained from Bank Indonesia publications, where the BI-Rate prior to 2016 and the BI 7-Day Reverse Repo Rate after 2016 are treated as the official policy rate indicators to ensure time-series consistency throughout the observation period.

The COVID-19 dummy variable is assigned a value of 1 during January 2020–December 2021, representing the period of the most severe pandemic-related economic disruptions, mobility restrictions, credit restructuring policies, and banking intermediation deterioration in Indonesia.

3.4. Model Specification

The relationship between banking performance and its determinants is modeled using an Autoregressive Distributed Lag (ARDL) framework. Let ROA_t denote banking performance at time t, which is influenced by credit distribution ($logLoan_t$), capital adequacy (CAR_t), interest rate ($BI\text{-}Rate_t$), and the COVID-19 dummy ($COVID_t$).

The general ARDL ($p'q^1'q^2'q^3'q^4'q^5$) specification is formulated as follows:

$$ROA_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, ROA_{t-i} + \sum_{j=0}^{q_1} \beta_{1j} \, LogLoan_{t-j} + \sum_{j=0}^{q_2} \beta_{2j} \, CAR_{t-j} + \sum_{j=0}^{q_3} \beta_{3j} \, LAR_{t-j} + \sum_{j=0}^{q_4} \beta_{4j} \, BI - Rate_{t-j} + \sum_{j=0}^{q_5} \beta_{5j} \, COVID_{t-j} + \varepsilon_t$$

To capture the short-run adjustment dynamics toward long-run equilibrium, the ARDL model is reparameterized into the following Error Correction Model (ECM) form:

$$\Delta ROA_t = \gamma_0 + \sum_{i=1}^{p-1} \gamma_i \, \Delta ROA_{t-i} + \sum_{j=0}^{q_1-1} \delta_{1j} \, \Delta LogLoan_{t-j} + \sum_{j=0}^{q_2-1} \delta_{2j} \, \Delta CAR_{t-j} + \sum_{j=0}^{q_3-1} \delta_{3j} \, \Delta LAR_{t-j} + \sum_{j=0}^{q_4-1} \delta_{4j} \, \Delta BI - Rate_{t-j} + \sum_{j=0}^{q_5-1} \delta_{5j} \, \Delta COVID_{t-j} + \lambda ECT_{t-1} + u_t$$

where Δ denotes the first-difference operator, ε_t and u_t are white-noise error terms, and ECT_{t-1} is the error correction term derived from the estimated long-run relationship. The coefficient λcaptures the speed of adjustment toward long-run equilibrium and is expected to be negative and statistically significant.

For completeness, the long-run relationship implied by the ARDL model can be expressed as:

$$ROA_t = \theta_0 + \theta_1 LogLoan_t + \theta_2 CAR_t + \theta_3 LAR_t + \theta_4 BI - Rate_t + \theta_5 COVID_t + e_t$$

where θ_k represent long-run coefficients. This specification allows the study to simultaneously estimate dynamic short-run adjustments and long-run equilibrium effects of internal banking factors, macroeconomic conditions, and pandemic shocks on banking performance.

3.5. Estimation Procedure

The estimation process begins with unit root testing using the Augmented Dickey-Fuller (ADF) test to determine the stationarity properties of each variable and ensure that none are integrated at order I(2). The optimal lag length is then determined using the Akaike Information Criterion (AIC), which provides an appropriate balance between model fit and model parsimony. Subsequently, the ARDL bounds testing approach developed by (Pesaran et al., 2001) is applied to examine the existence of a long-run equilibrium relationship among the variables.

Once cointegration is confirmed, the long-run coefficients are estimated, followed by the estimation of the Error Correction Model (ECM) to capture short-run dynamics and the speed of adjustment toward long-run equilibrium (Wooldridge, 2013). Furthermore, due to the presence of heteroskedasticity detected in the diagnostic tests, the ARDL estimations are re-estimated using heteroskedasticity and autocorrelation consistent (HAC) standard errors based on the Newey-West correction. This approach is employed to ensure robust statistical inference and improve the reliability of the estimated coefficients in the presence of potential heteroskedasticity and autocorrelation in the time-series data.

The study also conducts several diagnostic tests, including the Breusch-Godfrey serial correlation test, Breusch-Pagan-Godfrey heteroskedasticity test, Jarque-Bera normality test, and Ramsey RESET test for model specification to ensure the validity and reliability of the estimated model.

3.6. Diagnostic and Stability Tests

To ensure the validity and reliability of the estimated model, several diagnostic tests are conducted. Serial correlation is examined using the Breusch-Godfrey LM test to verify whether the residuals are independently distributed. Heteroskedasticity is tested using the Breusch-Pagan-Godfrey test to assess the constancy of the error variance. The normality of residuals is evaluated using the Jarque-Bera test.

In addition, the Ramsey RESET test is employed to examine the correctness of the model specification and to detect any potential omitted variable bias.

3.7. Theoretical Framework

This study is grounded in financial intermediation theory and bank performance theory, which emphasize that banking profitability is influenced by efficiency, capital adequacy, credit risk, and macroeconomic conditions. The ARDL framework enables the integration of these factors by capturing both short-run dynamics and long-run equilibrium relationships.

4. Results and Discussions

4.1. Analysis of Unit Root Test Results

Before estimating the ARDL model, the stationarity properties of the variables were examined using the Augmented Dickey-Fuller (ADF) unit root test. Testing stationarity is an important prerequisite in time-series analysis to avoid spurious regression problems and to determine the appropriate econometric approach (Gujarati & Porter, 2009; Wooldridge, 2013). The ARDL method developed by Pesaran et al. (2001) allows variables to be integrated at order zero, I(0), or order one, I(1), but does not permit variables integrated at order two, I(2). Therefore, the unit root test is necessary to ensure that none of the variables exceed the I(1) integration order before estimating the ARDL model.

Table 2. Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	Level t-Statistic	Level Prob.	Level Decision	First Difference t-Statistic	First Difference Prob.	First Difference Decision	Order of Integration
ROA	-3.2591	0.0183	Stationary	–	–	–	I(0)
Loan	1.8289	0.9998	Not Stationary	-13.1655	0.0000	Stationary	I(1)
CAR	-5.2260	0.0000	Stationary	–	–	–	I(0)
LAR	-3.3310	0.0149	Stationary	–	–	–	I(0)
BI-Rate	-1.7981	0.3807	Not Stationary	-10.9487	0.0000	Stationary	I(1)

Note: Lag length selection is based on Schwarz Information Criterion (SIC).
Source: Processed data using EViews 13 (2026)

Table 2 presents the results of the Augmented Dickey-Fuller (ADF) unit root test for all variables included in the model, namely banking profitability (ROA), credit distribution (Loan), capital adequacy (CAR), liquidity (LAR), and the monetary policy rate (BI-Rate). The lag length selection was determined automatically using the Schwarz Information Criterion (SIC), which is widely used in time-series analysis to determine optimal lag structures (Schwarz, 1978).

The findings indicate that ROA is stationary at level with a t-statistic value of -3.2591 and a probability value of 0.0183, which is below the 5% significance level. This result implies that banking profitability does not contain a unit root problem and fluctuates around a stable mean over time. Similarly, CAR and LAR are also stationary at level with probability values below 0.05, indicating that capital adequacy and liquidity conditions exhibit stable long-run behavior during the observation period. Specifically, CAR records a t-statistic of -5.2260 with a probability value of 0.0000, while LAR shows a t-statistic of -3.3310 with a probability value of 0.0149. These results suggest that both banking capital conditions and liquidity management remained relatively stable despite macroeconomic fluctuations and the COVID-19 pandemic shock.

In contrast, Loan and BI-Rate are found to be non-stationary at level because their probability values exceed the 5% significance threshold. The Loan variable records a t-statistic of 1.8289 with a probability value of 0.9998, indicating the presence of a unit root. Similarly, BI-Rate shows a t-statistic of -1.7981 with a probability value of 0.3807, suggesting that the monetary policy rate is also non-stationary at level. However, after first differencing, both variables become stationary with highly significant probability values of 0.0000. Loan records a first-difference t-statistic of -13.1655, while BI-Rate records -10.9487. Therefore, both variables are classified as integrated at order one, I(1).

Overall, the results indicate that the variables used in this study exhibit mixed orders of integration, consisting of I(0) and I(1) variables. Importantly, none of the variables are integrated at order two, I(2). This condition satisfies the primary requirement for applying the ARDL approach, which is particularly suitable for models containing a combination of stationary variables at level and first difference (Pesaran et al., 2001). The mixed integration order further justifies the use of the ARDL framework to estimate both short-run dynamics and long-run equilibrium relationships among banking profitability, lending activities, capital adequacy, liquidity conditions, monetary policy, and pandemic-related shocks in Indonesia.

4.2. Analysis of Diagnostic and Stability Test Results

The diagnostic test results presented in Table 3 indicate that the estimated ARDL model is generally acceptable for further empirical analysis, although several common issues in macro-financial time-series models are detected.

Table 3. Diagnostic and Stability Test Results

Test	Statistic	Prob.	Conclusion
Serial Correlation (Breusch-Godfrey)	F = 0.0639	0.9380	No serial correlation
	Obs*R^2 = 0.1410	0.9319	No serial correlation
Heteroskedasticity (Breusch-Pagan-Godfrey)	F = 2.2654	0.0075	Heteroskedasticity detected
	Obs*R^2 = 29.0482	0.0103	Heteroskedasticity detected
Normality (Jarque-Bera)	JB = 537.7028	0.0000	Residuals not normally distributed
Ramsey RESET Test	F = 0.0224	0.8812	Model correctly specified

Source: Processed data using EViews 13 (2026)

First, the Breusch-Godfrey LM test indicates that the model does not suffer from serial correlation, as evidenced by probability values exceeding the 5% significance level. This finding suggests that the residuals are independently distributed, implying that the estimated coefficients are not affected by autocorrelation problems. The absence of serial correlation is important in time-series estimation because autocorrelated residuals may produce inefficient estimators and misleading statistical inference (Gujarati & Porter, 2009).

Second, the Breusch-Pagan-Godfrey test reveals the presence of heteroskedasticity, as indicated by probability values below the 5% significance threshold. This suggests that the variance of the residuals is not constant over time. Nevertheless, heteroskedasticity is relatively common in macro-financial time-series data due to structural changes, economic cycles, and external shocks, particularly during the COVID-19 pandemic period. According to (Wooldridge, 2013), heteroskedasticity does not bias coefficient estimates, although it may affect the reliability of standard errors and statistical significance tests.

Third, the Jarque-Bera test indicates that the residuals are not normally distributed. This result may reflect the presence of extreme observations and structural disruptions during the observation period, especially during the pandemic shock. However, (Brooks, 2014) argues that normality is not a strict requirement in large-sample time-series estimation because the asymptotic properties of estimators remain valid.

Finally, the Ramsey RESET test confirms that the model is correctly specified, as indicated by the probability value exceeding the 5% significance level. This finding suggests that the estimated model does not suffer from major functional form misspecification or omitted variable bias.

Overall, the diagnostic test results indicate that the estimated ARDL model remains acceptable for empirical analysis, although the presence of heteroskedasticity and non-normal residuals suggests that the estimation results should be interpreted with caution. These issues are relatively common in macro-financial time-series models, particularly during periods of economic disruption and structural shocks such as the COVID-19 pandemic.

4.3. Analysis of ARDL Bounds Test

The ARDL bounds test was conducted to examine the existence of a long-run equilibrium relationship among banking profitability, credit distribution, capital adequacy, liquidity, monetary policy rates, and the COVID-19 shock. According to (Pesaran et al., 2001), cointegration exists when the computed F-statistic exceeds the upper bound critical value, I(1). Conversely, if the F-statistic is lower than the lower bound critical value, I(0), the null hypothesis of no cointegration cannot be rejected.

Table 4. ARDL Bounds Test for Cointegration

Test Statistic	Value
F-statistic	3.0459
Number of Regressors (k)	5

Critical Value Bounds

Significance Level	I(0) Bound	I(1) Bound
10%	2.08	3.00
5%	2.39	3.38
1%	3.06	4.15

Note: I(0) and I(1) represent the lower and upper bound critical values, respectively.
Source: Processed data using EViews 13 (2026)

Table 4 shows that the computed F-statistic is 3.0459. This value exceeds the upper bound critical value at the 10% significance level ($3.0459 > 3.00$), but remains below the upper bound critical value at the 5% significance level ($3.0459 < 3.38$). Therefore, the evidence of cointegration is supported at the 10% significance level, indicating the existence of a long-run relationship among the variables, although the long-run relationship is relatively moderate.

These findings imply that banking profitability in Indonesia maintains a long-run equilibrium relationship with lending activities, capital adequacy, liquidity conditions, monetary policy rates, and pandemic-related shocks. The existence of cointegration further justifies the estimation of long-run ARDL coefficients and the Error Correction Model (ECM) to capture both long-run equilibrium dynamics and short-run adjustment mechanisms.

The results are consistent with the ARDL framework proposed by Pesaran et al. (2001), which is appropriate for models containing variables integrated at mixed orders, namely I(0) and I(1). Since the unit root test previously confirmed that none of the variables are integrated at order two, I(2), the ARDL approach remains valid and econometrically appropriate for this study.

4.4. Analysis of Long-Run ARDL Estimation Results

Following the confirmation of cointegration through the ARDL bounds test, the long-run coefficients were estimated to examine the equilibrium relationship between banking profitability and its determinants. The long-run estimation results derived from the cointegrating equation are presented in Table 5.

Table 5. Long-Run ARDL Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Interpretation
LOG(LOAN)	-0.1707	0.2930	-0.5824	0.5610	Not Significant
CAR	0.0047	0.0310	0.1510	0.8801	Not Significant
LAR	-0.0429	0.0192	-2.2349	0.0267	Negative Significant
BI-RATE	-0.0695	0.0784	-0.8862	0.3767	Not Significant
COVID	-0.8013	0.2742	-2.9226	0.0039	Negative Significant
C	6.2966	4.0118	1.5695	0.1183	Not Significant

Note: Coefficients are derived from the cointegrating equation (CEC regression).
Source: Processed data using EViews 13 (2026).

The long-run estimation results indicate that liquidity and the COVID-19 pandemic significantly influence banking profitability in Indonesia over the long term. Liquidity, proxied by the Loan to Asset Ratio (LAR), exhibits a negative and statistically significant coefficient of -0.0429. This finding suggests that excessive allocation of assets into loans may weaken long-run banking profitability. Although lending activities generate interest income, an excessively high loan concentration may increase liquidity pressure, reduce financial flexibility, and elevate credit risk exposure, thereby negatively affecting banking performance over time.

This result implies that maintaining balanced liquidity management is essential for sustaining banking profitability in the long run. The finding is consistent with (Louzis et al., 2012), who argue that liquidity conditions significantly influence banking performance through delayed and dynamic adjustment mechanisms. In the Indonesian banking context, excessive lending relative to total assets may reduce the ability of banks to respond effectively to economic uncertainty and financial shocks.

The COVID-19 variable also shows a negative and statistically significant effect on banking profitability. The coefficient of -0.8013 indicates that the pandemic generated substantial long-run pressure on Indonesian banking performance. This finding reflects the adverse effects of economic contraction, weakening lending demand, rising credit restructuring, and increased uncertainty during the pandemic period. The result supports previous studies by (Demirguc-Kunt et al., 2021; Elnahass et al., 2021), which document that the COVID-19 crisis significantly weakened banking profitability and financial stability globally.

In contrast, credit distribution represented by Log(Loan) does not exhibit a statistically significant long-run effect on banking profitability. Although lending activities constitute the primary source of banking income, the insignificant coefficient suggests that aggregate credit expansion does not necessarily improve profitability in the long run. One possible explanation is that aggressive credit growth may simultaneously increase credit risk exposure and non-performing loans, thereby offsetting the positive contribution of interest income. This finding indicates that the quality of credit allocation may be more important than the quantity of lending itself.

34 Similarly, capital adequacy (CAR) is found to have a positive but statistically insignificant effect on banking profitability. This suggests that the relatively stable capital position of Indonesian banks may limit the marginal contribution of additional capital to profitability. Since most banks maintain capital levels above regulatory requirements, variations in CAR may not substantially affect long-run banking performance. This finding is broadly consistent with (Berger, 1995), who argues that beyond a certain threshold, higher capitalization does not necessarily enhance profitability.

Furthermore, the monetary policy rate (BI-Rate) has a negative but statistically insignificant effect on banking profitability. This result indicates that changes in Bank Indonesia's policy rate do not directly influence long-run banking profitability during the observation period. The weak significance may reflect limited monetary policy transmission to banking margins, particularly in a relatively stable banking system with adaptive interest rate adjustments. (Borio et al., 2017) similarly argue that the impact of interest rates on bank profitability depends heavily on banking structures, financial market conditions, and institutional characteristics.

Overall, the long-run ARDL estimation results indicate that banking profitability in Indonesia is more strongly affected by liquidity conditions and external shocks than by capital adequacy or monetary policy variables. These findings highlight the importance of prudent liquidity management and banking resilience in maintaining sustainable profitability, particularly during periods of economic uncertainty and structural disruptions.

4.5. Analysis of ARDL Estimation Results

62 Table 6 presents the dynamic ARDL estimation results using heteroskedasticity and autocorrelation consistent (HAC) standard errors based on the Newey-West correction. The use of HAC robust standard errors is intended to address the heteroskedasticity issue detected in the diagnostic tests and ensure more reliable statistical inference in the presence of potential heteroskedasticity and autocorrelation (Newey & West, 1987).

11 The ARDL estimation results reveal that banking profitability in Indonesia exhibits strong dynamic persistence over time. The lagged dependent variable ROA(-1) is positive and highly significant at the 1% significance level, indicating that previous banking profitability strongly influences current profitability. This finding suggests that banking performance adjustments occur gradually and that profitability dynamics in the Indonesian banking sector are characterized by substantial persistence. Similar persistence behavior in banking profitability has also been documented by (Athanasoglou et al., 2008), who argue that banking performance adjustments generally occur gradually due to operational rigidities and market structure characteristics.

Table 6. ARDL Dynamic Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA(-1)	0.7067	0.0504	14.0300	0.0000
ROA(-2)	0.0646	0.0961	0.6726	0.5022
ROA(-3)	0.2174	0.1164	1.8676	0.0636
ROA(-4)	-0.1540	0.0856	-1.7976	0.0740
LOG(LOAN)	-1.0056	0.2468	-4.0745	0.0001
LOG(LOAN(-1))	0.9774	0.2471	3.9555	0.0001
CAR	0.0008	0.0025	0.3146	0.7535
LAR	-0.0067	0.0165	-0.4068	0.6847
LAR(-1)	0.0045	0.0146	0.3119	0.7555
LAR(-2)	0.0047	0.0054	0.8828	0.3786
LAR(-3)	0.0137	0.0103	1.3223	0.1879
LAR(-4)	-0.0233	0.0094	-2.4789	0.0142
BI-RATE	-0.0115	0.0132	-0.8698	0.3857
COVID	-0.1324	0.0572	-2.3165	0.0217
C	1.0406	0.5120	2.0324	0.0437

Note: HAC/Newey-West robust standard errors are applied using the Bartlett kernel with a fixed bandwidth of 5.
Source: Processed data using EViews 13 (2026).

The estimation results further indicate that credit distribution, represented by Log(Loan), has a significant short-run effect on banking profitability. The contemporaneous coefficient of Log(Loan) is negative and statistically significant, while its lagged value is positive and significant. These findings suggest that rapid credit expansion may initially reduce profitability due to rising operational costs, risk exposure, and credit adjustment pressures. However, over time, lending activities may gradually contribute positively to profitability through interest income generation and financial intermediation activities. This dynamic relationship supports the financial intermediation theory, which emphasizes the role of credit allocation in generating banking income while simultaneously exposing banks to credit risk (Freixas & Rochet, 2008).

Liquidity, represented by the Loan to Asset Ratio (LAR), demonstrates mixed dynamic effects on banking profitability. While the contemporaneous and several lagged coefficients are statistically insignificant, the fourth lag of LAR exhibits a negative and significant effect. This result indicates that excessive loan concentration relative to total assets may weaken banking profitability after a certain adjustment period. The finding supports the argument that aggressive lending strategies may increase liquidity pressure and long-run credit risk exposure, thereby negatively affecting banking stability and profitability. (Louzis et al., 2012) similarly argue that deteriorating loan quality and liquidity pressure may significantly reduce banking performance over time.

Meanwhile, capital adequacy (CAR) does not exhibit a statistically significant effect on banking profitability in the short run. This finding implies that the relatively stable capitalization of Indonesian commercial banks may reduce the marginal impact of capital adequacy changes on short-term profitability performance. Similarly, the monetary policy rate (BI-Rate) is found to have a negative but statistically insignificant effect, suggesting that monetary policy transmission to banking profitability remains relatively limited during the observation period. (Borio et al., 2017) argue that the relationship between interest rates and banking profitability depends heavily on financial structure, market competition, and banking adjustment mechanisms.

The COVID-19 dummy variable shows a negative and statistically significant coefficient, indicating that the pandemic exerted substantial adverse effects on Indonesian banking profitability. This result reflects weakening economic activity, declining credit demand, rising loan restructuring, and increased uncertainty during the pandemic period. The finding is consistent with (Demirguc-Kunt et al., 2021; Elnahass et al., 2021), who document the detrimental impact of the COVID-19 crisis on banking profitability and financial stability across countries.

Overall, the ARDL estimation results indicate that banking profitability in Indonesia is primarily influenced by dynamic profitability persistence, credit adjustment mechanisms, liquidity conditions, and pandemic-related shocks. The findings further demonstrate that the Indonesian banking sector

responds gradually to both internal banking factors and external macroeconomic disturbances, highlighting the importance of prudent credit allocation and liquidity management in maintaining banking resilience and profitability.

4.6. Analysis of Model Summary Statistics

The model summary statistics presented in Table 7 indicate that the estimated ARDL model provides a strong and reliable fit to the data. The R-squared value of 0.8532 suggests that approximately 85.32% of the variation in banking performance (ROA) can be explained by the independent variables included in the model. This high explanatory power indicates that the selected variables credit distribution, capital adequacy, liquidity, interest rate, and the COVID-19 shock are relevant determinants of banking performance.

The adjusted R-squared value of 0.8409 further confirms the robustness of the model, as it accounts for the number of predictors used. The relatively small difference between R-squared and adjusted R-squared indicates that the model does not suffer from overfitting and that the included variables contribute meaningfully to explaining variations in ROA (Gujarati & Porter, 2009).

Table 7. Model Summary Statistics

Statistic	Value
R-squared	0.8532
Adjusted R-squared	0.8409
F-statistic	69.3243
Prob (F-statistic)	0.0000
Durbin-Watson	1.9903
Akaike Info Criterion	-0.7931
Schwarz Criterion	-0.5291

Source: Processed data using EViews 13 (2026)

The F-statistic of 69.3243, with a probability value of 0.0000, indicates that the model is jointly significant. This means that the independent variables, taken together, have a statistically significant effect on banking performance. According to (Wooldridge, 2013), a highly significant F-statistic provides strong evidence that the model has explanatory power and is not driven by random variation.

The Durbin-Watson statistic of 1.9903 is very close to the ideal value of 2, indicating that there is no serious autocorrelation in the residuals. This finding is consistent with the earlier Breusch-Godfrey test results and confirms that the model satisfies one of the key assumptions of time-series regression.

Furthermore, the Akaike Information Criterion (AIC) and Schwarz Criterion (SC) values are relatively low (negative), indicating a good balance between model fit and complexity. These information criteria are commonly used for model selection, and lower values suggest a more optimal specification (Akaike, 1974; Schwarz, 1978).

Overall, the model summary statistics demonstrate that the ARDL model is statistically sound, well-specified, and capable of explaining the dynamics of banking performance. These results provide a strong foundation for further interpretation of both short-run and long-run relationships.

4.7. Analysis of Error Correction Model (Short-Run Estimates)

Table 8 presents the Error Correction Model (ECM) estimation results using heteroskedasticity and autocorrelation consistent (HAC) standard errors based on the Newey-West correction. The ECM specification captures the short-run dynamics among variables as well as the speed of adjustment toward long-run equilibrium following temporary disequilibrium shocks.

The estimation results show that the error correction term (COINTEQ) is negative and statistically significant at the 1% significance level. The coefficient of -0.1653 indicates that approximately 16.5% of short-run disequilibrium is corrected in each period toward the long-run equilibrium path. This finding confirms the existence of a stable long-run relationship among banking profitability, credit distribution, liquidity, capital adequacy, monetary policy rates, and the COVID-19 shock. According to (Engle & Granger, 1987), a negative and statistically significant error correction term reflects the presence of long-run equilibrium adjustment within the estimated model.

Table 8. Error Correction Model (Short-Run Estimates)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ(-1)	-0.1653	0.0352	-4.6997	0.0000
D(ROA(-1))	-0.1281	0.0688	-1.8609	0.0645
D(ROA(-2))	-0.0634	0.0690	-0.9186	0.3596
D(ROA(-3))	0.1540	0.0670	2.2984	0.0227
DLOG(LOAN)	-1.0056	0.3240	-3.1037	0.0022
D(LAR)	-0.0067	0.0046	-1.4501	0.1489
D(LAR(-1))	0.0049	0.0047	1.0422	0.2988
D(LAR(-2))	0.0097	0.0047	2.0540	0.0415
D(LAR(-3))	0.0233	0.0046	5.0542	0.0000

Note: HAC/Newey-West robust standard errors are applied using the Bartlett kernel with a fixed bandwidth of 5.
Source: Processed data using EViews 13 (2026).

The ECM results further indicate that banking profitability demonstrates dynamic short-run adjustment behavior. The third lag of the differenced ROA variable exhibits a positive and statistically significant effect, suggesting that previous profitability conditions continue to influence short-run banking performance. This finding supports the persistence characteristic of banking profitability, where adjustments in banking operations and financial performance occur gradually over time (Athanasoglou et al., 2008).

Credit distribution, represented by Dlog(Loan), shows a negative and statistically significant effect on banking profitability in the short run. This result indicates that rapid short-term credit expansion may initially reduce profitability due to increased operational costs, credit risk exposure, and adjustment pressures associated with lending growth. Although lending activities generate interest income, excessive short-term credit expansion may weaken banking performance if not accompanied by effective risk management and prudent credit allocation.

Liquidity, represented by the differenced Loan to Asset Ratio (LAR), exhibits dynamic short-run effects on banking profitability. While the contemporaneous and first lag effects are statistically insignificant, the second and third lag coefficients are positive and statistically significant. These findings imply that liquidity adjustments may contribute positively to banking profitability after a certain adjustment period. The delayed positive impact suggests that liquidity management strategies require time before generating measurable improvements in banking performance and financial stability.

Overall, the ECM estimation results indicate that Indonesian banking profitability adjusts gradually toward long-run equilibrium following short-term shocks. The findings further demonstrate that credit adjustment mechanisms and liquidity management play important roles in determining short-run banking performance, while the significant error correction term confirms the stability of the long-run relationship among the variables included in the model.

4.8. Analysis of Hypothesis Testing Results

The hypothesis testing results are evaluated based on the estimated long-run and short-run ARDL-ECM coefficients using HAC/Newey-West robust standard errors. The analysis focuses on the direction, significance, and dynamic behavior of the relationships between banking profitability and its determinants in the Indonesian banking sector.

Table 9. Summary of Hypothesis Testing Results

Hypothesis	Statement	Result	Decision
H_1	Credit distribution has a significant effect on banking profitability.	Significant in the short run, but not significant in the long run.	Partially Supported
H_2	Capital adequacy has a positive effect on banking profitability.	Positive but statistically insignificant in both the short run and long run.	Not Supported
H_3	Liquidity has a significant effect on banking profitability.	Significant in both short-run dynamics and long-run estimation.	Supported

H_4	Monetary policy rates have a negative effect on banking profitability.	Negative but statistically insignificant.	Not Supported
H_5	The COVID-19 pandemic has a negative effect on banking profitability.	Negative and statistically significant.	Supported

Source: Processed data using EViews 13 (2026).

4.8.1. Effect of Credit Distribution on Banking Profitability

The first hypothesis proposes that credit distribution significantly affects banking profitability. The empirical findings indicate that credit distribution, represented by Log(Loan), exhibits a statistically significant effect in the short run but does not significantly influence profitability in the long run. The short-run estimation shows that rapid credit expansion negatively affects banking profitability, suggesting that aggressive lending growth may initially increase operational costs, credit risk exposure, and adjustment pressures within banking operations.

Although lending activities constitute the primary source of banking income through interest earnings, excessive short-term credit growth may weaken profitability when credit quality deteriorates or when risk management mechanisms are insufficient. This finding reflects the dual role of banking intermediation activities, where loan expansion simultaneously creates opportunities for income generation and increases exposure to credit risk. Over time, however, the long-run estimation indicates that aggregate credit growth does not significantly influence sustainable profitability, implying that the quality of credit allocation may be more important than the quantity of lending itself (Sofyan et al., 2026).

This finding supports the financial intermediation theory proposed by (Freixas & Rochet, 2008), which emphasizes that banking profitability depends not only on credit expansion but also on prudent risk management and efficient financial intermediation. The result also suggests that Indonesian banks may face diminishing profitability gains from excessive lending growth, particularly during periods of economic uncertainty and heightened financial risk.

4.8.2. Effect of Capital Adequacy on Banking Profitability

The second hypothesis states that capital adequacy positively affects banking profitability. However, the estimation results reveal that CAR has a positive but statistically insignificant effect on banking profitability in both the short-run and long-run estimations. This finding suggests that variations in bank capitalization do not substantially influence profitability performance during the observation period.

One possible explanation is that Indonesian commercial banks generally maintain capital levels above the minimum regulatory requirements imposed by the Financial Services Authority (OJK). As a result, additional increases in capital adequacy may not significantly improve profitability because banks already operate within relatively stable capital conditions. In such circumstances, higher capital ratios may primarily function as a prudential buffer rather than as a direct driver of profitability enhancement (Usman & Lestari, 2019).

The insignificant relationship between CAR and profitability is consistent with (Berger, 1995), who argues that beyond a certain threshold, additional capitalization may no longer generate substantial profitability gains. This finding also indicates that banking profitability in Indonesia may be more strongly influenced by operational efficiency, liquidity conditions, and external macroeconomic factors than by capital adequacy itself.

4.8.3. Effect of Liquidity on Banking Profitability

The third hypothesis examines the effect of liquidity on banking profitability. The empirical results indicate that liquidity, represented by the Loan to Asset Ratio (LAR), significantly affects banking profitability in both the short-run dynamics and long-run equilibrium relationship.

The long-run estimation shows that liquidity has a negative and statistically significant effect on banking profitability. This finding suggests that excessive allocation of assets into loans may weaken banking profitability over time due to increasing liquidity pressure and credit risk exposure. Although

lending activities generate interest income, excessive loan concentration may reduce banking flexibility in responding to unexpected liquidity needs and macroeconomic shocks (Sofyan et al., 2026).

Meanwhile, the ECM estimation reveals that several lagged differenced liquidity variables positively affect banking profitability in the short run. This result implies that liquidity adjustments may temporarily contribute positively to banking performance after certain adjustment periods. The delayed positive impact suggests that effective liquidity management strategies require time before generating measurable improvements in banking profitability.

This finding supports previous studies by (Louzis et al., 2012), who emphasize that liquidity management and loan quality are important determinants of banking performance and financial stability. In the Indonesian banking context, the results indicate that balanced liquidity allocation and prudent lending strategies are essential for maintaining sustainable profitability.

4.8.4. Effect of Monetary Policy Rates on Banking Profitability

The fourth hypothesis proposes that monetary policy rates negatively affect banking profitability. The estimation results indicate that the BI-Rate variable exhibits a negative but statistically insignificant effect on banking profitability in both the short-run and long-run estimations.

Although theoretically higher policy interest rates may reduce lending demand and increase funding costs, the empirical findings suggest that monetary policy transmission to banking profitability remains relatively weak during the observation period. One possible explanation is that Indonesian banks may adjust lending rates and deposit rates adaptively, thereby reducing the direct impact of monetary policy changes on profitability performance (Pamungkas et al., 2025).

Furthermore, the relatively stable banking structure and strong banking intermediation during the observation period may have weakened the sensitivity of banking profitability to changes in policy interest rates. This finding is consistent with (Borio et al., 2017), who argue that the relationship between interest rates and banking profitability depends heavily on banking structures, market competition, and financial system characteristics.

The insignificant effect also indicates that banking profitability in Indonesia may be influenced more strongly by internal banking conditions and macroeconomic shocks than by monetary policy adjustments alone (Jahidah et al., 2024).

4.8.5. Effect of the COVID-19 Pandemic on Banking Profitability

The fifth hypothesis states that the COVID-19 pandemic negatively affects banking profitability. The empirical findings strongly support this hypothesis, as the COVID dummy variable exhibits a negative and statistically significant effect on banking profitability.

The pandemic generated substantial economic disruption, declining lending demand, rising loan restructuring, and heightened financial uncertainty, all of which exerted downward pressure on banking performance. During the pandemic period, banks experienced weakening credit growth and increasing credit risk exposure, which reduced profitability and operational efficiency. The implementation of large-scale social restrictions and declining economic activity further weakened the overall banking business environment (Tumbelaka, 2025).

The significant negative impact of the COVID-19 variable confirms that external macroeconomic shocks play a crucial role in shaping banking profitability dynamics. This finding is consistent with (Demirguc-Kunt et al., 2021; Elnahass et al., 2021), who document that the COVID-19 crisis significantly weakened banking profitability and financial stability across many countries.

In the Indonesian banking context, the findings indicate the importance of banking resilience, prudent risk management, and adaptive financial strategies in responding to periods of severe economic disruption and uncertainty.

5. Conclusions

5.1. Conclusion

This study examines the effects of credit distribution, capital adequacy, liquidity, monetary policy rates, and the COVID-19 pandemic on banking profitability in Indonesia using the Autoregressive Distributed Lag (ARDL) framework with monthly data from 2010 to 2025. The ARDL bounds testing approach confirms the existence of a long-run equilibrium relationship among the variables, while the Error Correction Model (ECM) demonstrates gradual short-run adjustment toward long-run equilibrium. To improve estimation reliability, HAC/Newey-West robust standard errors are employed in the presence of heteroskedasticity and potential autocorrelation.

The empirical findings reveal that liquidity conditions and the COVID-19 pandemic significantly influence banking profitability in the long run. Liquidity, proxied by the Loan to Asset Ratio (LAR), exhibits a negative long-run effect, indicating that excessive loan concentration may increase liquidity pressure and credit risk exposure, thereby weakening banking profitability over time. The COVID-19 pandemic also exerts a substantial negative impact on banking profitability, reflecting weakening economic activity, declining credit demand, and heightened financial uncertainty during the pandemic period.

In the short run, banking profitability demonstrates strong dynamic persistence and gradual adjustment behavior. Credit distribution significantly affects profitability in the short run, where rapid credit expansion initially reduces profitability due to adjustment costs and rising risk exposure before gradually contributing to income generation. Meanwhile, capital adequacy and monetary policy rates do not exhibit statistically significant effects during the observation period, suggesting that Indonesian banking profitability is influenced more strongly by liquidity management, lending dynamics, and external macroeconomic shocks than by capitalization or policy rate movements.

Overall, this study contributes to the banking and financial literature by providing dynamic evidence on banking profitability determinants using high-frequency monthly data and an ARDL-ECM framework incorporating structural pandemic shocks. The findings highlight the importance of prudent liquidity management, balanced credit allocation, and banking resilience strategies in maintaining sustainable profitability during periods of economic uncertainty and financial disruption.

5.2. Research Limitations

Despite providing important empirical findings, this study has several limitations that should be acknowledged. First, the study uses aggregate banking industry data rather than individual bank-level data. Consequently, the analysis may not fully capture heterogeneity across banks with different ownership structures, business models, operational scales, and risk profiles.

Second, the study focuses primarily on selected internal banking variables and one macroeconomic policy variable. Other potentially important determinants of banking profitability, such as inflation, exchange rates, GDP growth, non-performing loans (NPL), operational efficiency, and digital banking development, are not explicitly included in the model.

Third, although the ARDL approach is appropriate for capturing dynamic relationships between integrated variables of order I(0) and I(1), the model remains limited to linear relationships and may not fully capture nonlinear dynamics, structural regime shifts, or asymmetric responses during periods of severe economic disruption.

Finally, while HAC/Newey-West robust standard errors are applied to address heteroskedasticity and potential autocorrelation, the presence of non-normal residuals indicates that the estimation results should still be interpreted cautiously, particularly during periods characterized by extreme economic shocks such as the COVID-19 pandemic.

5.3. Suggestions and Directions for Future Research

Future studies are encouraged to extend this research in several important directions. First, future researchers may employ bank-level panel data to capture differences in profitability determinants across various categories of banks, including state-owned banks, private banks, regional development banks, and Islamic banks. Panel approaches may also provide richer insights regarding bank-specific heterogeneity and dynamic adjustment behavior.

Second, future research could incorporate additional macroeconomic and financial variables, such as inflation, exchange rates, GDP growth, non-performing loans, financial technology adoption, digital banking penetration, and financial market volatility, to obtain a more comprehensive understanding of banking profitability determinants.

Third, future studies may consider applying nonlinear econometric approaches, such as nonlinear ARDL (NARDL), threshold regression, or regime-switching models, to capture potential asymmetric effects of monetary policy, liquidity conditions, and economic shocks on banking profitability.

Fourth, given the growing importance of financial digitalization and sustainable finance, future research may also investigate the impact of digital banking transformation, ESG implementation, green financing, and climate-related financial risks on banking profitability and financial stability.

Finally, future studies may examine the post-pandemic banking environment more comprehensively by extending the observation period and evaluating whether the long-run effects of the COVID-19 crisis persist under evolving macroeconomic and financial conditions.

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