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Credit, Liquidity, and Pandemic Shock Effects on Indonesian Banking Profitability 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 were analyzed using the Auto-Regressive Distributed Lag (ARDL) and Error Correction Model (ECM) approaches. HAC/Newey-West robust standard errors were employed to improve estimation reliability.

Results: The findings confirm a long-run relationship between the variables. Credit distribution exhibits dynamic effects on profitability, while liquidity significantly affects profitability in both the short and long runs. The COVID-19 variable negatively affects banking profitability, whereas capital adequacy and monetary policy rates are statistically insignificant. The ECM results indicate a 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 has 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 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, Brissimis, & Delis, 2008; Beck, Demirguc-Kunt, & Levine, 2010). In Indonesia, the banking sector's performance has experienced substantial fluctuations over the past decade, particularly during the COVID-19 pandemic.

According to data published in *Statistik Perbankan Indonesia* by the Financial Services Authority (*Otoritas Jasa Keuangan*-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 slow credit growth, increasing credit restructuring, and rising credit risk exposure. In 2020, ROA decreased to approximately 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 continued to increase, indicating relatively strong resilience within the Indonesian banking sector after the pandemic shock (OJK, 2025).

Simultaneously, Indonesian banking intermediation 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 because of 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 activity. In addition, Bank Indonesia implemented accommodative monetary policies through lower policy interest rates to support economic recovery and maintain financial system stability in the country. These developments indicate that banking profitability in Indonesia is dynamically influenced by lending activities, liquidity conditions, monetary policies, and external economic shocks.

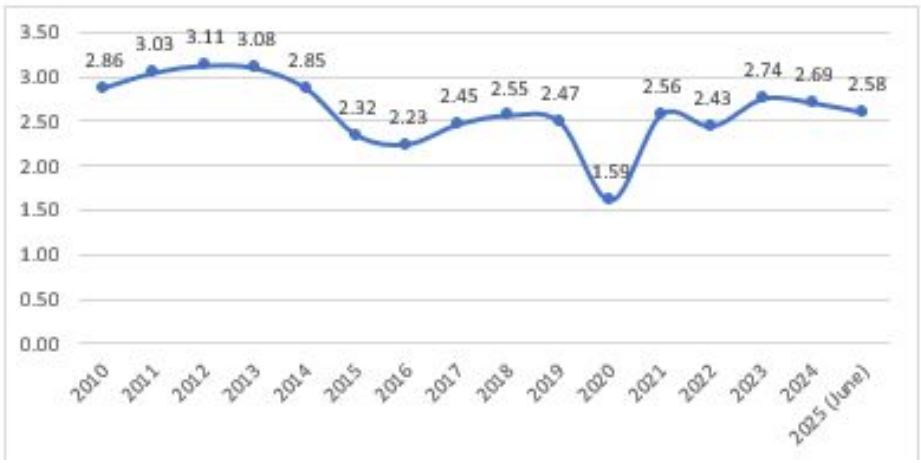

Figure 1. Trend of Indonesian Banking ROA before, during, and after COVID-19

Figure 1 illustrates that Indonesian banking profitability remained relatively stable before the COVID-19 pandemic but declined sharply in 2020 due to economic disruptions, rising credit risk, and weakening lending activities. Following the pandemic, banking profitability gradually recovered alongside improving macroeconomic conditions and banking sector resilience. 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)

The COVID-19 pandemic, in particular, created significant disruptions in banking activities by increasing credit risk, reducing lending demand, and exerting pressure on banks' profitability. Previous studies have confirmed that the pandemic weakened banking performance globally and exposed structural vulnerabilities within financial systems (Demirguc-Kunt, Pedraza, & Ruiz-Ortega, 2021; Elnahass, Trinh, & Li, 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.

The literature generally identifies two broad categories of determinants affecting banking performance: 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 suggest that banking performance is increasingly shaped by dynamic adjustments, macro-financial linkages, and external uncertainty (Borio, Gambacorta, & Hofmann, 2017; Mies, 2024).

Despite the growing literature on banking profitability, several important gaps remain. First, most previous studies rely on annual or panel data, which may not adequately capture short-term fluctuations and rapid adjustments in banking activity. 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 few 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 crises (Aysan, Belatik, Unal, & Ettaai, 2022; Demirguc-Kunt et al., 2021). To address these gaps, this study employs monthly time-series data from January 2010 to June 2025 and applies the ARDL approach (Pesaran,

Shin, & Smith, 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). This 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, offering deeper insights into short-term banking adjustments. Second, it integrates internal banking variables and macroeconomic conditions within a unified empirical framework to explain the banking profitability dynamics more comprehensively. Third, this study explicitly captures the impact of structural shocks, particularly the COVID-19 pandemic, on banking profitability in the short and long runs. The findings are expected to have 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 Hypotheses 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. 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 that affect financial intermediation.

Additionally, bank profitability theory emphasizes the importance of balancing profitability, liquidity, and risk management to maintain sustainable banking performance. The 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 the efficiency of financial intermediation (Borio et al., 2017).

Previous studies have confirmed that banking profitability is influenced by both internal and external determinants. Athanasoglou et al. (2008); Petria, Capraru, and Ihnatov (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. 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 are 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, Demirguc-Kunt, & Levine, 2010). Similarly Athanasoglou, Brissimis, and Delis (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, Hamid, and Khan (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 will positively affect 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 on the banking performance

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 bank profitability. Lee and Hsieh (2013) find that higher capital adequacy improves banking stability and reduces financial risk, thereby supporting profitability.

Similarly, Berger and Bouwman (2013) argue that stronger capital positions enhance banking resilience during financial crises. However, when banking systems maintain capital buffers above regulatory requirements, the marginal contribution of additional capital to profitability may become limited. This condition is particularly relevant in stable banking systems, where banks consistently maintain capital adequacy above the minimum regulatory standards. Therefore, this study expects capital adequacy to positively affect bank profitability.

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

2.4 Liquidity and Banking Performance

Liquidity management is an essential component of banking operations because banks must maintain sufficient liquidity while maximizing profitability. According to the 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 than productive earning assets. The Loan to Asset Ratio (LAR) reflects the extent to which banks allocate their assets to loans. Higher liquidity utilization through lending activities may increase profitability, as loans generate interest income. Nevertheless, liquidity effects may not occur immediately because the process of transforming liquid assets into productive loans requires time and adjustments.

Previous studies have demonstrated that liquidity influences banking profitability through dynamic adjustments. Louzis, Vouldis, and Metaxas (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.

H_3: Liquidity significantly affects banking performance through dynamic adjustments

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 underwent 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 benchmark interest rate throughout the observation period.

Previous studies indicate that lower interest rates may reduce bank profitability by compressing interest margins, whereas higher rates may increase funding costs and credit risk exposure (Claessens, Coleman, & Donnelly, 2018). However, the effect of policy rates on profitability may vary depending on banking structure, liquidity conditions, and macroeconomic environment. Therefore, this study expects policy interest rates to negatively affect banking profitability.

H_4: Policy interest rates negatively affect the banking performance

2.6 COVID-19 Pandemic and Banking Performance

The COVID-19 pandemic represents a major external shock that has 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 due to rising loan restructuring and weakening financial intermediation activities. This study incorporated 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 of credit demand. Previous studies confirm that the pandemic negatively affected banking profitability and financial stability worldwide (Ashraf, 2020; Elnahass et al., 2021). Therefore, the COVID-19 shock is expected to negatively influence bank profitability in Indonesia.

H_5: The COVID-19 pandemic negatively affects bank performance

Nevertheless, future studies should 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. First, most previous studies rely on annual or panel data, which may not adequately capture short-term fluctuations and rapid adjustments in banking activity. Second, prior studies often analyze internal banking factors and macroeconomic conditions separately rather than within an integrated dynamic framework. Third, relatively few 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 the internal banking factors, monetary policy, and pandemic shocks affecting Indonesian banking profitability.

3. Research Methodology

3.1 Research Design

This study was classified as a non-experimental quantitative time-series study using secondary data. This study aims to analyze the determinants of banking performance in Indonesia using an econometric approach. This 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 of time-series data with relatively limited observations (Pesaran et al., 2001).

3.2 Data and Sources

This study utilized monthly time-series data from January 2010 to June 2025, resulting in approximately 186 observations. The data were 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 (*Otoritas Jasa Keuangan*-OJK). Macroeconomic variables are obtained from Bank Indonesia and the Central Statistics Agency (*Badan Pusat Statistik*-BPS), where the BI-Rate is used to represent monetary policy. In addition, a dummy variable was incorporated to capture the impact of the COVID-19 pandemic, taking a value of one during the pandemic period and zero otherwise. All variables were aggregated at the national banking level and processed to ensure consistency in frequency and time alignment. Furthermore, the loan variable was transformed into a natural logarithmic form to improve the data distribution and reduce potential heteroskedasticity.

3.3 Variables Measurement

The variables used in this study are defined based on concepts established in the 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 heteroscedasticity, and ensure comparability across time.

Capital strength is measured using the Capital Adequacy Ratio (CAR), which indicates a 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 to earning assets. Macroeconomic conditions are represented by the policy interest rate proxied by the BI-Rate, which serves as a key monetary policy instrument influencing banking activity. 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 the variables are summarized in Table 1

Table 1. Operational definition of variables

Variables	Definition	Measurement
ROA	Bank profitability indicators (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 levels (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 the country.

3.4 Model Specification

The relationship between banking performFormula 1ance and its determinants is modeled using an ARDL framework. Let ROAt denote banking performance at time , which is influenced by credit

distribution (logLoant), capital adequacy (CARt), interest rate (BI-Ratet), and the COVID-19 dummy (COVIDt). The general ARDL (p'q1'q2'q3'q4'q5) specification is Formula 1 as follows:

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

To capture the short-run adjustment dyna(5)(3)mics toward long-run equilibrium, the ARDL Formula 2 is reparameterized into the following Error Correction Model (ECM) form:

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

where denotes the first-difference operator, εt and ut are white-noise error terms, and ECTt-1 is the error correction term derived from estimating the long-run relationship. The coefficient captures 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 Formula 3 can be expressed as.

$$ROA_t = \theta_0 + \theta_1 LogLoan_t + \theta_2 CAR_t + \theta_3 LAR_t + \theta_4 BI - Rate_t + \theta_5 COVID_t + e_t \quad (3)$$

where represent long-run coefficients. This specification allows the study to simultaneously estimate the 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 began with unit root testing using the Augmented Dickey-Fuller (ADF) test to determine the stationarity properties of each variable and ensure that none were integrated at order I (2). The optimal lag length is then determined using the Akaike Information Criterion (AIC), which provides an appropriate balance between the model fit and 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, owing 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 heteroscedasticity 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

Several diagnostic tests were conducted to ensure the validity and reliability of the estimated model. Serial correlation is examined using the Breusch-Godfrey LM test to verify whether the residuals are independently distributed. Heteroskedasticity was tested using the Breusch-Pagan-Godfrey test to

assess the constancy of the error variance. The normality of the residuals was evaluated using the Jarque-Bera test. In addition, the Ramsey RESET test is employed to examine the correctness of the model specification and detect any potential omitted variable bias.

3.7 Theoretical Framework

This study is grounded in financial intermediation and bank performance theories, 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 the 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 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 to be integrated at order two, I(2). Therefore, a 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 .

Table 2. Augmented Dickey-Fuller (ADF) unit root test results

Variables	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 the Schwarz Information Criterion (SIC).

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 (Loans), Capital Adequacy Ratio (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 the 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 and thus significant. This result implies that banking profitability does not contain a unit root problem and fluctuates around a stable mean. Similarly, CAR and LAR are 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.

In contrast, Loan and BI-Rate are found to be non-stationary at the 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 the 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 the 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 the level and first difference (Pesaran et al., 2001). The mixed integration order further justifies the use of the ARDL framework to estimate both the 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
	R^2 = 0.1410	0.9319	No serial correlation
Heteroskedasticity (Breusch-Pagan-Godfrey)	F = 2.2654	0.0075	Heteroskedasticity detected
	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

First, the Breusch-Godfrey Lagrange Multiplier (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 inferences (Gujarati & Porter, 2009).

Second, the Breusch-Pagan-Godfrey test reveals the presence of heteroscedasticity, as indicated by probability values below the 5% significance threshold. This suggests that the variance in the residuals is not constant over time. Nevertheless, heteroskedasticity is relatively common in macro-financial time-series data because of structural changes, economic cycles, and external shocks, particularly during the COVID-19 pandemic. 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, particularly 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 suggest 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 between 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.

Table 4 shows that the computed F-statistic is 3.0459. This value exceeds the upper bound critical value at the 10% significance level , but remains below the upper bound critical value at the 5% significance level . 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 weak. 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 is 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 shown in Table 5.

Table 5. Long-run ARDL estimation results

Variables	**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).

The long-run estimation results indicate that liquidity and the COVID-19 pandemic significantly influenced 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 to 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 bank performance over time. This result implies that maintaining balanced liquidity management is essential for sustaining banking profitability in the long term. This 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 banks' ability to respond effectively to economic uncertainty and financial shocks.

The COVID-19 variable also has 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 banks' performance. This finding reflects the adverse effects of economic contraction, weakening lending demand, rising credit restructuring, and increased uncertainty during the pandemic. This result supports previous studies by Demirguc-Kunt et al. (2021); Elnahass et al. (2021), which documented 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, 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.

Similarly, Capital Adequacy Ratio (CAR) has 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 their profitability. Since most banks maintain capital levels above regulatory requirements, variations in CAR may not substantially affect the 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 policy rate do not directly influence long-run banking profitability during the study 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) 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 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 disruption.

4.5 Analysis of ARDL Estimation Results

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). The ARDL estimation results revealed 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 influenced 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

Variables	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 five.

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, whereas 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 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 risks (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 has a negative and significant effect. This result indicates that excessive loan concentration relative to total assets may weaken banking profitability after a certain period. This 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) argue that deteriorating loan quality and liquidity pressure may significantly reduce banking performance over time.

However, Capital Adequacy Ratio (CAR) does not have 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) has 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 the financial structure, market competition,

and banking adjustment mechanisms. The COVID-19 dummy variable shows a negative and statistically significant coefficient, indicating that the pandemic had 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. This finding is consistent with Demirguc-Kunt et al. (2021) and Elnahass et al. (2021), who documented 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 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 for all models. 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 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. 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

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 the 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 were relatively low (negative), indicating a good balance between the 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 the short- 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 and 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% level. The coefficient of -0.1653 indicates that approximately 16.5% of the 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 between banking profitability, credit distribution, liquidity, capital adequacy, monetary policy rates, and the COVID-19 shock. According to Engle and Granger (1987), a negative and statistically significant error correction term reflects the presence of a long-run equilibrium adjustment within the estimated model.

Table 8. Error correction model (Short-Run Estimates)

Variables	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 five.

The ECM results further indicate that banking profitability demonstrates a 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 bank performance. This finding supports the persistence characteristic of banking profitability, where adjustments in banking operations and financial performance occur gradually (Athanasoglou et al., 2008).

Credit distribution, represented by Dlog (Loan), has a negative and statistically significant effect on banking profitability in the short run. This 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 it is 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 significant. These findings imply that liquidity adjustments may contribute positively to banking profitability after a certain period. The delayed positive impact suggests that liquidity management strategies require time to generate measurable improvements in banking performance and financial stability.

Overall, the ECM estimation results indicate that Indonesian banking profitability gradually adjusts 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 this model.

4.8 Analysis of Hypotheses Testing Results

Table 9 presents the hypothesis testing results are evaluated based on the estimated long-run and short-run ARDL-ECM coefficients using the HAC or Newey-West robust standard errors. This 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

Hypotheses	Statement	Result	Decision
H_1	Credit distribution significantly affects banking profitability.	Significant in the short run but not significant in the long run.	Partially Supported
H_2	Capital adequacy positively affects banking profitability.	It is positive but statistically insignificant in both the short and long runs.	Not Supported
H_3	Liquidity significantly affects banking profitability.	Significant in both short-run dynamics and long-run estimations.	Supported
H_4	Monetary policy rates negatively affect banking profitability.	The results were negative but statistically insignificant.	Not Supported
H_5	The COVID-19 pandemic negatively affected banking profitability.	The results were negative and statistically significant.	Supported

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 credit risk exposure. However, over time, 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, Suteja, & Anwar, 2026).

This finding supports the financial intermediation theory proposed by Freixas and Rochet (2008), which emphasizes that banking profitability depends not only on credit expansion but also on prudent risk management and efficient financial intermediation. The results also suggest 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 bank profitability. However, the estimation results reveal that CAR has a positive but statistically insignificant effect on banking profitability in both 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).

Consequently, 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 prudential buffers rather than direct drivers 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 capital adequacy.

4.8.3 Effect of Liquidity on Banking Profitability

The third hypothesis examines the effect of liquidity on bank 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 bank profitability. This finding suggests that excessive allocation of assets to 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 banks' 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 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 to generate measurable improvements in banking profitability. This finding supports previous studies by Louzis et al. (2012), who emphasized 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 profits.

4.8.4 Effect of Monetary Policy Rates on Banking Profitability

The fourth hypothesis proposes that monetary policy rates negatively affect banking profits. 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 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 the 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, Sofyan, & Suteja, 2024).

4.8.5 Effect of the COVID-19 Pandemic on Banking Profitability

The fifth hypothesis states that the COVID-19 pandemic negatively affects bank profitability. The empirical findings strongly support this hypothesis, as the COVID dummy variable exhibits a negative and 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 a downward pressure on banking performance. During the pandemic, 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 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. This finding is consistent with Demirguc-Kunt et al. (2021); Elnahass et al. (2021), who documented 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 severe economic disruption and uncertainty.

5. Conclusions

5.1 Conclusion

This study investigates the effects of credit distribution, capital adequacy, liquidity, monetary policy rates, and the COVID-19 pandemic on banking profitability in Indonesia using an ARDL-ECM framework with monthly data from 2010 to 2025. The results confirm a long-run equilibrium relationship, with HAC or Newey-West robust standard errors applied to improve estimation reliability. In the long run, liquidity and the COVID-19 pandemic significantly reduce banking profitability, while in the short run, profitability exhibits dynamic persistence and credit distribution significantly influences profitability through initial adjustment costs and risk exposure. Capital adequacy and monetary policy rates are not statistically significant, indicating that banking profitability is driven primarily by liquidity management, lending dynamics, and external shocks. Overall, this study contributes to the banking literature by providing dynamic evidence from high-frequency data and highlighting the importance of prudent liquidity management, balanced credit allocation, and banking resilience in sustaining profitability during periods of economic uncertainty.

5.2 Research Limitations

Despite providing important empirical findings, this study has some limitations that should be acknowledged. First, this study uses aggregate banking industry data rather than individual bank-level data. Consequently, the analysis may not fully capture the heterogeneity across banks with different ownership structures, business models, operational scales, and risk profiles. Second, this 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 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 should extend this research in several important directions. First, future researchers may employ bank-level panel data to capture differences in profitability determinants across various bank categories, including state-owned, private, regional development, and Islamic banks. Panel approaches may also provide richer insights into 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 the determinants of banking profitability.

Third, future studies should consider applying nonlinear econometric approaches, such as nonlinear ARDL (NARDL), threshold regression, or regime-switching models, to capture the 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 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 should 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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Author Contributions
RS conceptualized the study, developed the research design, and supervised the overall research process. IPSM conducted data collection, organized the dataset, and prepared the materials required for analysis. MRRG performed data analysis, interpreted the findings, and contributed to refining the methodological procedures. LL sections of the manuscript. MS drafted substantial parts of the manuscript, carried out critical revisions, and provided final approval of the version submitted for publication.

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