



# Efficiency, Risk, and Fintech as Indonesian Bank Profitability Drivers

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## ABSTRACT

Bank profitability is essential to financial intermediation and financial system stability, particularly in emerging economies undergoing rapid digital transformation. This study examines the associations of bank-specific factors, market structure, macroeconomic conditions, and fintech lending with the profitability of ten major Indonesian banks from 2018 to 2024. Annual panel data are analyzed using the one-step System Generalized Method of Moments. Bank profitability is measured using Return on Average Assets, Return on Average Equity, Net Interest Margin, Risk-Adjusted Return on Average Assets, and Risk-Adjusted Return on Average Equity. The findings indicate that the cost-to-income ratio is negatively associated with all five profitability measures, highlighting the importance of management efficiency. Credit risk, liquidity, income diversification, market concentration, inflation, and long-term interest rates exhibit different associations across conventional and risk-adjusted measures. Fintech lending is negatively associated with Net Interest Margin and both risk-adjusted profitability measures. These findings demonstrate that conventional and risk-adjusted indicators provide distinct perspectives on bank performance. Bank managers should therefore strengthen operational efficiency, credit risk management, and liquidity management while developing appropriate strategies to respond to increasing competition from fintech lending.

## INTRODUCTION

Banks contribute to economic growth and financial system stability. Banks function as intermediary institutions and support investment and economic activity (Zeqiraj et al., 2020). Profitability and financial stability enable banks to sustain their intermediation role. Bank failures have the potential to reduce public confidence in the banking system and threaten financial stability, especially in developing countries that are highly dependent on the banking sector as a financial intermediary institution.

As the banking industry becomes larger and more complex, researchers should assess bank profitability by considering asset size, operational efficiency, and risk exposure. Large banks possess substantial financial capacity and perform a central function in financial intermediation (Blank et al., 2009; Huu Vu & Thanh Ngo, 2023; Nguyen et al., 2022; Tri Wahyudi et al., 2021; Yudaruddin, 2024). However, larger asset holdings do not necessarily generate stronger financial performance (Blatter & Fuster, 2022). Therefore, researchers need to examine how banks allocate internal resources and respond to economic and technological changes.

Indonesia, as an emerging economy, provides a relevant setting for further investigation because the banking sector plays a central role in financial intermediation (Tri Wahyudi et al., 2021; Yudaruddin, 2024). The expansion of fintech lending has also intensified competition in the credit market (Chen et al., 2018; Junarsin et al., 2023; Phan et al., 2020; Yudaruddin, 2024). Meanwhile, macroeconomic changes, regulatory developments, and digital transformation continue to reshape the Indonesian banking landscape (Cantika Daeli & Kusumaning Wedari, 2025; Khoiriah et al., 2026). These developments provide a strong basis for examining the relationships among efficiency, risk, fintech lending, and bank profitability.

This study measures bank profitability using Return on Average Assets (ROAA), Return on Average Equity (ROAE), and Net Interest Margin (NIM). It also employs Risk-Adjusted Return on Average Assets (RAROAA) and Risk-Adjusted Return on Average Equity (RAROAE) to evaluate bank returns relative to the associated risks (Laporšek et al., 2024). By combining conventional and risk-adjusted indicators, this study distinguishes

nominal profitability from performance that accounts for risk exposure.

Previous studies have identified various determinants of bank profitability. However, researchers often examine bank-specific characteristics, macroeconomic conditions, and fintech development separately (Bernardelli & Carrasco-Gutierrez, 2024; Laporšek et al., 2024; O'Connell, 2023; Pham et al., 2024). Few studies have integrated efficiency, risk, market structure, macroeconomic conditions, and fintech lending into a dynamic model for emerging Asian banking markets, including Indonesia. Previous research has also placed greater emphasis on conventional profitability measures than on risk-adjusted indicators (Laporšek et al., 2024). This gap is important because banks may generate high nominal returns while simultaneously assuming substantial risk exposure.

This study applies a dynamic panel approach to analyze the determinants of profitability among major Indonesian banks from 2018 to 2024. The empirical framework integrates bank efficiency, risk, market structure, macroeconomic conditions, and fintech lending. The analysis compares conventional profitability indicators (ROAA, ROAE, and NIM) with risk-adjusted indicators (RAROAA and RAROAE) to determine whether these factors exhibit different relationships with bank performance after accounting for risk.

## LITERATURE REVIEW

### Theoretical Background

The determinants of bank profitability are explained through four theoretical perspectives: Financial Intermediation Theory, the Structure-Conduct-Performance (SCP) paradigm, the Efficient Structure Hypothesis (ESH), and Signaling Theory. Each perspective provides a distinct explanation of how internal and external factors influence bank performance. In Financial Intermediation Theory, value is created by financial intermediaries through the reduction of transaction costs and information asymmetries between savers and borrowers (Kennedy et al., 1960). Banks are also regarded as delegated monitors that mobilize depositors' funds and allocate credit based on their informational advantage in assessing and monitoring borrowers (Diamond, 1984).

From this perspective, bank profitability is determined partly by the quality of financial intermediation. Greater value can be generated when credit risk is effectively managed, adequate liquidity is maintained, and capital is efficiently allocated. This theoretical framework therefore supports the inclusion of loan intensity, credit risk, liquidity, and capital adequacy as bank-specific determinants. Financial Intermediation Theory can also be applied to explain the competitive pressure created by fintech lending. Alternative credit channels are provided by peer-to-peer lending platforms, thereby challenging the delegated monitoring function traditionally performed by banks. Consequently, pressure may be placed on banks' net interest margins and risk-adjusted returns (Duygun et al., 2021).

Bank profitability is examined through four theoretical perspectives: Financial Intermediation Theory, the Structure-Conduct-Performance (SCP) paradigm, the Efficient Structure Hypothesis (ESH), and Signaling Theory. Under Financial Intermediation Theory, value is created by banks through the reduction of transaction costs and information asymmetries between savers and borrowers (Kennedy et al., 1960). As delegated monitors, deposits are mobilized and credit is extended by banks based on their capacity to assess and monitor borrowers (Diamond, 1984). From this perspective, profitability is partly determined by the effectiveness of credit allocation, risk and liquidity management, and capital utilization. Accordingly, loan intensity, credit risk, liquidity, and capital adequacy are included as bank-specific determinants. Fintech lending is also viewed as an alternative channel of credit intermediation. Competition from fintech lending platforms may influence banks' lending activities and subsequently place pressure on their net interest margins and risk-adjusted returns (Duygun et al., 2021).

According to the Structure-Conduct-Performance (SCP) paradigm, firm behavior and performance are influenced by market structure (Mason, 1939; Bain, 1951, 1956). In the banking sector, market power may be strengthened by greater market concentration, thereby enabling pricing practices that can increase profitability (Berger & Hannan, 1989). Accordingly, market concentration is measured using the Herfindahl-Hirschman Index (HHI). The relationship between market concentration and profitability is particularly

relevant in Indonesia because a substantial proportion of banking assets is controlled by major banks.

According to the Efficient Structure Hypothesis (ESH), differences in bank profitability are primarily explained by variations in operational efficiency rather than market power. Stronger financial performance and a larger market share may be achieved by banks through effective cost management and productive resource allocation (Demsetz, 1973; Maudos et al., 2002; Khan et al., 2026). Accordingly, management efficiency is assessed using the cost-to-income ratio. Bank size is also included to capture potential economies of scale, while income diversification is incorporated to represent the breadth of banking activities. Therefore, the ESH is complementary to, rather than contradictory with, the SCP paradigm. While the SCP paradigm explains the effects of external market structure on profitability, the ESH explains why banks within the same market may still exhibit significant differences in profitability. (Laporšek et al., 2024).

Finally, Spence's (1973) Signaling Theory explains how information from the external environment influences the strategic decisions of banks, investors, and customers. (Spence, 1973). In the banking sector, changes in market structure, economic growth, inflation, interest rates, and fintech development may act as external signals that affect bank strategy and profitability. Previous studies show that bank profitability is influenced by industry-specific and macroeconomic factors, including market concentration, GDP growth, inflation, and interest rates (Athanasoglou et al., 2008; Petria et al., 2015; Saif-Alyousfi, 2022). Fintech development is also increasingly important because it may affect bank performance through digital innovation, competition and changes in financial intermediation (Yoon et al., 2023; Yudaruddin, 2024). The internal and external determinants of bank profitability are examined through an integrated framework comprising four theoretical perspectives. The relationship of lending and risk management with bank performance is explained by Financial Intermediation Theory. The roles of market concentration and operational efficiency are interpreted through the SCP paradigm and ESH, respectively. Meanwhile, banks' responses to macroeconomic changes and fintech development are examined through Signaling Theory.

## Bank Profitability and Risk-Adjusted Performance

Bank profitability reflects the ability of banks to generate earnings from assets, equity and core intermediation activities. Profitability is an important indicator of bank performance because it supports financial resilience, enables banks to absorb shocks and strengthens the stability of the financial system. A profitable bank is generally better able to expand lending, maintain public confidence and respond to changes in economic and financial conditions (Borroni & Rossi, 2019; Saif-Alyousfi, 2022). In this study, bank profitability is measured using three conventional indicators: Return on Average Assets (ROAA), Return on Average Equity (ROAE) and Net Interest Margin (NIM). ROAA measures the ability of banks to generate profit from average total assets, while ROAE reflects the ability to generate returns from average equity. NIM captures the ability of banks to generate net interest income from earning assets. These indicators are widely used in banking studies because they represent different dimensions of performance, namely asset-based profitability, equity-based profitability and interest-based profitability (Athanasoglou et al., 2008; Davis et al., 2022; Saif-Alyousfi, 2022).

However, conventional profitability measures do not fully explain the risks taken by banks to generate returns. A bank may appear profitable based on ROAA, ROAE or NIM, but its performance may be less stable when risk exposure is considered. Therefore, this study also uses risk-adjusted profitability measures, namely Risk-Adjusted Return on Average Assets (RAROAA) and Risk-Adjusted Return on Average Equity (RAROAE). These measures provide a broader understanding of bank performance because they consider both return and the volatility of that return (Borroni & Rossi, 2019; Laporšek et al., 2024). The use of both conventional and risk-adjusted profitability measures is important in this study because Indonesian banks operate in a dynamic environment shaped by efficiency pressures, risk exposure, macroeconomic changes and fintech lending competition. By using ROAA, ROAE, NIM, RAROAA and RAROAE, this study provides a more comprehensive assessment of bank profitability and performance quality.

## HYPOTHESIS DEVELOPMENT

### Internal Drivers of Bank Profitability

Internal profitability drivers refer to bank-specific factors that reflect managerial decisions, operational efficiency, risk exposure and income structure. These factors are important because they can be directly managed by banks and may determine how effectively banks generate profits from their resources. In this study, internal drivers include bank size, capital adequacy, loan intensity, credit risk, liquidity, management efficiency and income diversification. Differences in bank profitability across institutions and periods are commonly explained using these variables in empirical banking studies (Bernardelli & Carrasco-Gutierrez, 2024; Laporšek et al., 2024).

The scale of a bank's operations is represented by bank size, which is measured using the natural logarithm of total assets. Economies of scale, broader market access, and diversification may provide advantages to larger banks; however, these benefits may be offset by greater organizational complexity. Accordingly, prior findings on the relationship between bank size and profitability are mixed (Laporšek et al., 2024; Phan et al., 2020; Priharto & Gani, 2023).

Capital adequacy indicates a bank's capacity to absorb losses and sustain its operations. A stronger capital position may support profitability by enhancing stability and confidence, but its relationship with performance may differ across conventional and risk-adjusted measures (Laporšek et al., 2024; Pham et al., 2024; Priharto & Gani, 2023). Loan intensity, or the share of assets allocated to lending, may increase interest income; its contribution to profitability nevertheless depends on credit quality and risk management (Laporšek et al., 2024). Credit risk, commonly proxied by non-performing loans, is generally expected to reduce profitability through higher provisioning expenses and lower income from impaired loans (Horobet et al., 2021; Mashamba & Chikutuma, 2023; Priharto & Gani, 2023).

**H1:** Bank size is significantly associated with bank profitability.

**H2:** Capital adequacy is positively associated with bank profitability.

**H3:** Loan intensity is positively associated with bank profitability.

**H4:** Credit risk is negatively associated with bank profitability.

**H5:** Liquidity is significantly associated with bank profitability.

**H6:** The cost-to-income ratio is negatively associated with bank profitability.

**H7:** Income diversification is significantly associated with bank profitability.

#### External Drivers of Bank Profitability

External determinants of bank profitability arise from conditions beyond an individual bank's control, including industry structure and the macroeconomic environment (Bernardelli & Carrasco-Gutierrez, 2024). Market concentration, GDP growth, inflation, and long-term interest rates are included as external determinants in this study. Market concentration is measured using the Herfindahl-Hirschman Index (HHI), which is calculated from banks' market shares, typically based on total assets (Horobet et al., 2021; Laporšek et al., 2024). The relationship between market concentration and profitability remains theoretically inconclusive. Bank market power may be strengthened by greater concentration, whereas incentives to improve operational efficiency may be weakened by reduced competition. Mixed findings have also been reported in previous empirical studies (Bernardelli & Carrasco-Gutierrez, 2024; Horobet et al., 2021; O'Connell, 2023).

Bank profitability is also influenced by macroeconomic conditions. GDP growth captures changes in economic activity and income generation. Higher GDP growth is generally associated with stronger demand for financial intermediation, lending activities and banking services. Therefore, economic growth may support bank profitability. Previous studies show that GDP growth can affect bank profitability, although the direction and significance of its effect may differ across banking systems and periods (Bernardelli & Carrasco-Gutierrez, 2024; Laporšek et al., 2024; Saif-Alyousfi, 2022). Inflation may influence bank profitability through changes in interest rates, lending costs and purchasing power. Moderate inflation may improve bank margins when banks are able to adjust lending rates, but high inflation can increase uncertainty, reduce purchasing power and weaken credit quality. Previous studies provide mixed evidence. O'Connell (2023) found that inflation can affect bank profitability in the

UK banking sector, while Horobet et al., (2021) reported a negative relationship between inflation and bank profitability.

Long-term interest rates influence loan pricing, funding costs, investment decisions and banks' asset-liability management. Higher long-term interest rates may increase bank profitability through wider interest margins, but they may also reduce credit demand and increase borrowing costs. Kohlsheer et al. (2018) found a positive relationship between long-term interest rates and bank profitability, while Bernardelli and Carrasco-Gutierrez (2024) identified interest-rate conditions as a relevant macroeconomic determinant. The strength and direction of this relationship may depend on market conditions and banks' asset-liability management.

**H8:** Market concentration is significantly associated with bank profitability.

**H9:** GDP growth is positively associated with bank profitability.

**H10:** Inflation is significantly associated with bank profitability.

**H11:** Long-term interest rates are significantly associated with bank profitability.

#### Fintech lending and bank profitability

Fintech lending is an external determinant of bank profitability because it introduces alternative channels of credit intermediation. Access to financial services and operational efficiency may be improved through digital financial services, although competition with traditional banks may also be intensified. Bank performance may be influenced by digital innovation, changes in customer behavior, and shifts in credit market competition (Phan et al., 2020; Yoon et al., 2023; Yudaruddin, 2024). In this study, fintech lending development is represented by peer-to-peer lending.

As fintech lending platforms expand, credit may increasingly be obtained by borrowers outside the traditional banking sector. Consequently, banks' share of the credit market may be reduced, and pressure may be placed on their net interest margins. Phan et al. (2020) characterize this development as the potential substitution of activities traditionally performed by banks. In Indonesia, a negative relationship between fintech loan growth and commercial bank margins was

identified by Ariffandi and Trinugroho (2022).

Mixed findings have been reported regarding the effects of fintech development. Financial activity and innovation may be stimulated by fintech development, whereas competition may be intensified and lending margins may be compressed (Ariffandi & Trinugroho, 2022; Nguyen et al., 2022; Phan et al., 2020). Therefore, the relationship between fintech development and bank profitability may be shaped by banks' responses to digital competition. Accordingly, fintech lending is examined as a distinct external determinant of bank profitability.

### Literature Synthesis and Research Positioning

A broad range of bank profitability determinants has been examined in previous research, although these factors have often been analyzed within separate empirical frameworks. In studies of bank-specific characteristics, particular emphasis has been placed on efficiency, capital adequacy, credit risk, and liquidity (Horobet et al., 2021; Laporšek et al., 2024; Mashamba & Chikutuma, 2023). Macroeconomic conditions and market concentration have been examined in another strand of the literature (Bernardelli & Carrasco-Gutierrez, 2024; O'Connell, 2023; Saif-Alyousfi, 2022). Meanwhile, the competitive effects of digital finance on banks have been investigated in fintech lending studies (Nguyen et al., 2022; Phan et al., 2020; Yudaruddin, 2024). Consequently, limited evidence has been provided on the relationships of efficiency, risk, market structure, and fintech lending with profitability within a unified model. This research gap is addressed by jointly assessing these determinants among major Indonesian banks.

Bank profitability is commonly assessed using conventional measures such as return on assets and return on equity, which report returns without explicitly accounting for their variability over time (Tarawneh et al., 2024). Yet banks with similar average returns may differ substantially in the stability of those returns. Laporšek et al. (2024) incorporated risk-adjusted profitability measures and found that the relationships between some determinants and profitability differed after risk adjustment. These findings suggest that conclusions based solely on conventional indicators may provide an incomplete account of bank performance. Evidence comparing

conventional and risk-adjusted measures using the same set of bank-specific, macroeconomic, market, and fintech variables remains limited, particularly in emerging Asian banking markets.

The applicability of findings from other banking systems to Indonesia warrants further examination because institutional conditions, financial markets, and fintech regulation may differ. Indonesian studies have examined fintech competition and bank margins (Ariffandi & Trinugroho, 2022; Yudaruddin, 2024) as well as bank-specific profitability determinants (Tri Wahyudi et al., 2021; Priharta & Gani, 2023). However, the existing literature indicates that further dynamic analysis is required to integrate bank-specific factors, macroeconomic conditions, market concentration, and fintech lending within a unified framework. Within this framework, conventional and risk-adjusted profitability measures can be compared to determine whether the observed relationships change after return variability is considered.

Prior research is extended in three respects. First, bank efficiency and risk are examined together with market concentration, macroeconomic conditions, and fintech lending. Second, conventional and risk-adjusted profitability measures are compared within the same dynamic panel framework. Third, evidence from an emerging Asian banking market is provided through an analysis of major Indonesian banks. By identifying whether profitability determinants vary across these measures, relevant insights are provided for bank management and financial supervision amid digital transformation.

## RESEARCH METHODS

### Sample and Data Sources

Ten listed Indonesian banks were selected based on asset size and the availability of complete financial data: BMRI, BBRI, BBKA, BBNI, BBTN, BRIS, BNGA, NISP, BNLI, and BDMN. Therefore, large publicly listed banks are represented by the sample, rather than the Indonesian banking sector as a whole. Because BRIS operates as an Islamic bank, equivalent income measures disclosed in its financial reports must be used carefully when NIM and interest-based income are compared across the sampled banks.

Bank-level data were obtained from annual reports and the Indonesia Stock Exchange, while GDP growth and inflation data were collected from BPS. Data on banking assets and peer-to-peer (P2P) lending were obtained from OJK, and ten-year Indonesian government bond yields were retrieved from Investing.com. Market concentration was calculated from banks' assets using a clearly specified industry denominator. Before the bank-level and annual national variables were merged, the measurement period, units, and transformations applied to the P2P lending data were documented to ensure the reproducibility of the analysis.

Ten banks were observed annually from 2018 to 2024, producing a maximum of 70 bank-year observations before observations with missing data were excluded. Bank profitability was measured using ROAA, ROAE, NIM, RAROA, and RAROE. Bank-specific determinants were represented by bank size, capital adequacy, loan intensity, credit risk, liquidity, management efficiency, and income diversification. External determinants were represented by market concentration, GDP growth, inflation, long-term interest rates, and fintech lending. Through this panel structure, differences across banks and changes over time could be analyzed simultaneously.

## Variables

Table 1. Variable Operational Definition

| Variable                                                   | Definition                                                                                  | Formula/Data source                                                                                                          |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Dependent variables: Measures of bank profitability</b> |                                                                                             |                                                                                                                              |
| ROAA                                                       | Bank's ability to generate returns from average total assets.                               | Net Income/Average Total Assets                                                                                              |
| ROAE                                                       | Bank's ability to generate returns from average total equity.                               | Net Income/Average Total Equity                                                                                              |
| NIM                                                        | Bank's ability to generate net interest income from earning assets.                         | Net Interest Income/Average Earning Assets×100%                                                                              |
| RAROA                                                      | Risk-adjusted return on average assets, measured by ROAA relative to its volatility.        | RAROA = annual return / standard deviation of that return; state bank-level calculation window and handle zero denominators. |
| RAROE                                                      | Risk-adjusted return on average equity, measured by ROAE relative to its volatility.        | RAROE = annual return / standard deviation of that return; state bank-level calculation window and handle zero denominators. |
| <b>Internal drivers</b>                                    |                                                                                             |                                                                                                                              |
| Bank Size                                                  | The scale of bank operations.                                                               | Natural logarithm of total assets                                                                                            |
| Equity-to-assets (labeled CAR in original data)            | Book equity divided by total assets; this is not regulatory risk-weighted capital adequacy. | Equity/Total Assets×100%                                                                                                     |
| Loan Intensity                                             | The proportion of bank assets allocated to lending activities.                              | Net Loans/Total Assets×100%                                                                                                  |
| Credit Risk                                                | Risk arising from borrowers' inability to repay loans according to agreed terms.            | Non-performing Loans/Total Loans×100%                                                                                        |
| Liquidity                                                  | Bank's ability to meet short-term obligations and maintain liquid assets.                   | Liquid Assets/Total Assets×100%                                                                                              |
| Management Efficiency                                      | Bank efficiency in controlling operating costs relative to operating income.                | Total Operating Costs/Total Operating Income×100%                                                                            |
| Income Diversification                                     | The extent to which banks generate income from non-interest activities.                     | $1 - [(\text{Net Interest Income} - \text{Other Operating Income}) / \text{Total Operating Income}]$                         |
| <b>External drivers</b>                                    |                                                                                             |                                                                                                                              |
| Market Concentration                                       | Degree of concentration in the banking industry.                                            | Herfindahl–Hirschman Index: $HHI = \sum Si^2$                                                                                |
| GDP Growth                                                 | Annual economic growth.                                                                     | Central Statistics Agency/BPS                                                                                                |
| Inflation                                                  | General increase in the price level of goods and services.                                  | Annual percentage change in CPI; BPS (verify transformation in dataset).                                                     |
| Long-Term Interest Rate                                    | Yield on 10-year Indonesian government bonds.                                               | Investing.com                                                                                                                |
| Fintech Lending                                            | Credit disbursement through peer-to-peer lending platforms.                                 | OJK annual P2P lending disbursements; state units and any logarithmic transformation.                                        |

Source: Authors' compilation based on Bernardelli & Carrasco-Gutierrez (2024); Horobet et al. (2021); Phan et al. (2020); Saif-Alyousfi (2022); Yoon et al. (2023); Yudaruddin (2024).

### Model

To examine the dynamic associations between profitability determinants and bank performance, this study estimates a panel model using one-step System GMM. The model includes a lagged dependent variable to capture persistence in profitability and uses internal instruments to

address potential endogeneity and unobserved bank-specific effects. Given the small number of banks and years, the instrument specification and diagnostic tests are reported and interpreted with caution. The general empirical model is specified as follows:

$$Prof_{it} = \alpha Prof_{it-1} + \sum_{m=1}^M \beta_m Internal X_{it}^m + \sum_{n=1}^N \beta_n External X_{it}^n + c_t + \varepsilon_{it}$$

Each model defines profitability for  $i$  bank in year  $t$  using one of five measures: ROAA, ROAE, NIM, RAROOA, or RAROE. The lagged profitability measure accounts for possible persistence over time. Bank-level explanatory variables comprise size, equity-to-assets, net-loans-to-assets, non-performing loans, liquid-assets-to-assets, cost-to-income, and income diversification. Year-level variables comprise industry-wide HHI, GDP growth, inflation, the ten-year government bond yield, and fintech lending. As these external variables change only across years, the seven-year panel provides limited variation for estimating their individual associations. The models include an error term, with standard errors and instrument diagnostics reported for each estimation.

## RESULTS AND DISCUSSION

### Descriptive Analysis

Table 2 presents the descriptive statistics of all variables used in this study. The sample consists of 70 bank-year observations from ten major Indonesian banks during the 2018–2024 period. Across the major Indonesian banks observed, mean ROAA, ROAE, and NIM are 1.68, 11.71, and 5.28, with standard deviations of 0.86, 5.13, and 1.29, respectively. These standard deviations show variation in conventional profitability measures during the study period. Mean RAROOA and RAROE are 3.65 and 3.68, respectively, providing a supplementary view of returns relative to the volatility measure used in their calculation.

Table 2. Descriptive Statistics

| Variable | Obs | Mean    | Std. dev. | Min    | Max   |
|----------|-----|---------|-----------|--------|-------|
| ROAA     | 70  | 1.68271 | 0.86414   | 0.07   | 3.84  |
| ROAE     | 70  | 11.7121 | 5.12854   | 0.88   | 22.25 |
| NIM      | 70  | 5.28214 | 1.28787   | 2.86   | 8.90  |
| RAROOA   | 70  | 3.64786 | 1.83153   | 0.24   | 9.39  |
| RAROE    | 70  | 3.67757 | 1.75219   | 0.20   | 9.05  |
| SIZE     | 70  | 8.69629 | 0.37567   | 8.18   | 9.39  |
| CAR      | 70  | 16.841  | 3.07866   | 12.66  | 24.01 |
| LAR      | 70  | 63.4593 | 5.78542   | 49.71  | 78.14 |
| NPL      | 70  | 0.90786 | 0.57464   | 0.20   | 2.96  |
| LR       | 70  | 39.9474 | 14.4069   | 23.46  | 98.08 |
| CIR      | 70  | 53.3071 | 13.6837   | 35.14  | 87.24 |
| IDIV     | 70  | 0.46871 | 0.12076   | 0.15   | 0.72  |
| HHI      | 70  | 0.08647 | 0.00765   | 0.0729 | 0.097 |
| GDP      | 70  | 3.88429 | 2.49973   | -2.07  | 5.31  |
| INF      | 70  | 2.72714 | 1.2678    | 1.57   | 5.51  |
| IR_LONG  | 70  | 6.82429 | 0.60961   | 5.94   | 7.99  |
| FIN      | 70  | 5.36429 | 0.54891   | 4.36   | 6.02  |

Source: Stata Output, 2025.

For the bank-specific variables, a mean bank size of 8.69 and a standard deviation of 0.38 were recorded, indicating relatively limited variation in size across the sampled banks. Mean values of 16.84, 63.46, and 0.91 were reported for capital adequacy, loan intensity, and non-performing loans, respectively. The loan intensity figure shows that lending accounts for a substantial share of sampled banks' assets. Mean liquidity and cost-to-income ratios are 39.95 and 53.31, while income diversification averages 0.47.

For the external variables, mean HHI is 0.086. GDP growth, inflation, and the ten-year government bond yield average 3.88, 2.73, and 6.82, respectively. Fintech lending has a mean value of 5.36; its interpretation depends on the unit and transformation specified in the variable definitions.

### Correlation Matrix

Table 3 reports selected Pearson correlations among the study variables. No pair of explanatory variables has a correlation coefficient exceeding 0.800, suggesting that strong pairwise correlations are unlikely. However, these results alone do not rule out multicollinearity involving several variables.

Several significant correlations are observed. ROAA is strongly and positively correlated with ROAE, suggesting that asset-based profitability tends to move in line with equity-based profitability. Bank size is positively correlated with ROAA and ROAE, indicating that larger banks may have stronger profitability. Meanwhile, the cost-to-income ratio is negatively correlated with ROAA and ROAE, showing that higher operating costs relative to income are associated with lower profitability. In addition, HHI is positively correlated with fintech lending, suggesting that fintech lending development may be related to the structure of the banking market.

Table 3. Pearson Correlation Results

| Variable Pair | Correlation Coefficient | Direction | Interpretation                                                                                 |
|---------------|-------------------------|-----------|------------------------------------------------------------------------------------------------|
| ROAA – ROAE   | 0.87*                   | Positive  | Banks with higher returns on average assets tend to generate higher returns on average equity. |
| SIZE – ROAA   | 0.66*                   | Positive  | Larger banks tend to have higher asset-based profitability.                                    |
| SIZE – ROAE   | 0.70*                   | Positive  | Larger banks tend to generate higher equity-based returns.                                     |
| NIM – LAR     | 0.42*                   | Positive  | A higher proportion of loans to assets is associated with higher net interest margin.          |
| CIR – ROAA    | -0.53*                  | Negative  | Higher operating costs relative to income are associated with lower asset-based profitability. |
| CIR – ROAE    | -0.70*                  | Negative  | Lower management efficiency is associated with lower equity-based profitability.               |
| HHI – IR_LONG | -0.80*                  | Negative  | Higher market concentration is associated with lower long-term interest rates.                 |
| HHI – FIN     | 0.79*                   | Positive  | Higher market concentration is associated with greater fintech lending development.            |

Source: Author, 2025.

### Model Diagnostic Tests

Before interpreting the System GMM estimation results, several diagnostic tests were conducted to evaluate the validity and reliability of the models. The diagnostic tests include the Sargan test for over-identifying restrictions and

the Arellano-Bond AR(1) and AR(2) tests for serial correlation. The Sargan test is used to assess the validity of the instruments, while the AR(1) and AR(2) tests are used to examine whether the residuals contain serial correlation.

Table 4. Model Diagnostic Test

| Model | Sargan Test p-value | AR(1) p-value | AR(2) p-value | Interpretation                                                                                         |
|-------|---------------------|---------------|---------------|--------------------------------------------------------------------------------------------------------|
| ROAA  | 0.326               | 0.150         | 0.074         | Instruments are valid and no second-order serial correlation is detected.                              |
| ROAE  | 0.060               | 0.426         | 0.428         | Instruments are valid and no second-order serial correlation is detected.                              |
| NIM   | 0.336               | 0.023         | 0.715         | Instruments are valid. AR(1) is significant, but AR(2) is not significant, so the model is acceptable. |

Table 4. (continued)

| Model | Sargan Test<br>p-value | AR(1)<br>p-value | AR(2)<br>p-value | Interpretation                                                            |
|-------|------------------------|------------------|------------------|---------------------------------------------------------------------------|
| RAROA | 0.491                  | 0.105            | 0.790            | Instruments are valid and no second-order serial correlation is detected. |
| RAROE | 0.633                  | 0.230            | 0.917            | Instruments are valid and no second-order serial correlation is detected. |

Source: Author, 2025.

Notes: The Sargan test examines the validity of instruments. AR(1) and AR(2) tests examine serial correlation in the residuals. The model is considered valid when the Sargan test and AR(2) p-values are above 0.05. In dynamic panel estimation, significant AR(1) may occur and does not invalidate the model as long as AR(2) is not significant.

As reported in Table 4, the Sargan test yields p-values above 0.05 across all models, indicating that the null hypothesis of the overidentification test is not rejected. The Arellano–Bond AR(2) tests are also insignificant, indicating that the tests do not detect second-order serial correlation in the differenced residuals. Although the AR(1) test is significant for the NIM model, first-order serial correlation in differenced residuals is commonly expected in dynamic panel estimation. The diagnostic results support the specified System GMM models; however, instrument validity cannot be conclusively established, particularly because more instruments are used than the number of bank groups included in the analysis. Accordingly, the estimated coefficients are interpreted with caution.

### System GMM Results for Conventional Profitability

Table 5 presents the System GMM results for conventional profitability, measured by ROAA, ROAE and NIM. The lagged dependent variable is significant only for NIM, indicating that net interest margin has a persistent pattern over time. Meanwhile,

ROAA and ROAE are more influenced by current internal and external conditions. For internal drivers, bank size has a positive and significant effect only on ROAA, while capital adequacy positively affects ROAA and ROAE. Loan intensity has a positive effect on NIM, showing that lending activities directly contribute to interest-based income. Credit risk negatively affects NIM, indicating that higher non-performing loans reduce banks' ability to generate net interest income. Liquidity has a positive effect on ROAA and NIM, while management efficiency has a negative and significant effect on all conventional profitability indicators. This confirms that higher operating costs reduce bank profitability. Income diversification negatively affects ROAA and NIM, suggesting that non-interest income activities do not always improve profitability. For external drivers, market concentration positively affects ROAE, while GDP growth positively affects ROAA. Inflation has a negative effect on ROAE but a positive effect on NIM. Long-term interest rates and fintech lending negatively affect NIM, indicating that interest rate movements and digital lending competition may place pressure on banks' interest margins.

Table 5. The System GMM results for conventional profitability

| Variable                | (1) ROAA            |         | (2) ROAE            |         | (3) NIM              |         |
|-------------------------|---------------------|---------|---------------------|---------|----------------------|---------|
|                         | Coefficients        | p-value | Coefficients        | p-value | Coefficients         | p-value |
| Dependent t-1           | 0.203<br>(0.141)    | 0.151   | -0.07<br>(0.0868)   | 0.393   | 0.672***<br>(0.172)  | 0.000   |
| <b>Internal Factors</b> |                     |         |                     |         |                      |         |
| SIZE                    | 2.574*<br>(1.226)   | 0.036   | 0.902<br>(1.246)    | 0.469   | 1.563<br>(1.416)     | 0.270   |
| CAR                     | 1.603*<br>(0.802)   | 0.046   | 0.125*<br>(0.0632)  | 0.048   | 0.053<br>(0.0495)    | 0.284   |
| LAR                     | 0.0389<br>(0.031)   | 0.210   | -0.0276<br>(0.0320) | 0.389   | 3.909*<br>(1.898)    | 0.039   |
| NPL                     | -0.242<br>(0.172)   | 0.159   | -0.287<br>(0.224)   | 0.201   | -0.653**<br>(0.234)  | 0.005   |
| LR                      | 0.0591*<br>(0.0591) | 0.033   | 0.0141<br>(0.0141)  | 0.364   | 0.0455**<br>(0.0455) | 0.005   |

Table 5. (Continued)

| Variable                | (1) ROAA     |         | (2) ROAE     |         | (3) NIM      |         |
|-------------------------|--------------|---------|--------------|---------|--------------|---------|
|                         | Coefficients | p-value | Coefficients | p-value | Coefficients | p-value |
|                         | (0.02780     |         | (0.0155)     |         | (0.0163)     |         |
| CIR                     | -0.031***    | 0.000   | -0.03***     | 0.001   | -0.039***    | 0.000   |
|                         | (0.0066)     |         | (0.0107)     |         | (0.0101)     |         |
| IDIV                    | -1.407*      | 0.048   | 0.689        | 0.552   | -0.741**     | 0.005   |
|                         | (0.711)      |         | (1.157)      |         | (0.267)      |         |
| <b>External Factors</b> |              |         |              |         |              |         |
| HHI                     | 27.181       | 0.131   | 36.727*      | 0.018   | -32.921      | 0.074   |
|                         | (17.990)     |         | (15.570)     |         | (18.420)     |         |
| GDP                     | 0.0846*      | 0.011   | 0.0301       | 0.406   | 0.0554       | 0.095   |
|                         | (0.0332)     |         | (0.0362)     |         | (0.0332)     |         |
| INF                     | -0.0586      | 0.143   | -0.0665*     | 0.019   | 0.0827**     | 0.009   |
|                         | (0.040)      |         | (0.0284)     |         | (0.0316)     |         |
| IR_LONG                 | 0.486        | 0.219   | 0.771        | 0.052   | -0.693*      | 0.019   |
|                         | (0.396)      |         | (0.397)      |         | (0.295)      |         |
| FIN                     | -0.601       | 0.054   | -0.422       | 0.190   | -0.718*      | 0.014   |
|                         | (0.311)      |         | (0.322)      |         | (0.292)      |         |
| _cons                   | -30.33**     | 0.007   | -10.44       | 0.349   | -17.81       | 0.211   |
|                         | (11.300)     |         | (11.150)     |         | (14.240)     |         |
| Prob > F                |              |         | 0.000        |         |              |         |
| N                       | 60           |         | 60           |         | 60           |         |
| AR(1)                   | 0.150        |         | 0.426        |         | 0.023        |         |
| AR(2)                   | 0.074        |         | 0.428        |         | 0.715        |         |
| Sargan test (p-value)   | 0.326        |         | 0.06         |         | 0.336        |         |

Source: Stata Output, 2025.

Notes: \* p < 0.10; \*\* p < 0.05; \*\*\* p < 0.01.

### System GMM Results for Risk-Adjusted Profitability

Table 6 reports the System GMM results for risk-adjusted profitability, measured by RAROA and RAROE. The results show that risk-adjusted profitability responds differently from conventional profitability. The lagged dependent variables, bank size, capital adequacy and loan intensity do not significantly affect RAROA or RAROE. This indicates that larger size, stronger capital and higher lending allocation do not automatically improve profitability after risk adjustment.

Credit risk, management efficiency and income diversification have negative and significant effects on both RAROA and RAROE. These findings suggest that higher non-performing loans, cost inefficiency and poorly managed diversification reduce the quality of bank profitability when risk is considered. In contrast, liquidity has a positive and significant effect on both risk-adjusted indicators, showing that adequate liquidity supports more stable profitability.

Table 6. System GMM Results for Risk-Adjusted Profitability

| Variable                | (1) RAROA    |         | (2) RAROE    |         |
|-------------------------|--------------|---------|--------------|---------|
|                         | Coefficients | p-value | Coefficients | p-value |
| Dependent t-1           | 0.0552       | 0.735   | 0.099        | 0.541   |
|                         | (0.163)      |         | (0.162)      |         |
| <b>Internal Factors</b> |              |         |              |         |
| SIZE                    | 2.265        | 0.129   | 2.684        | 0.112   |

Table 6. (Continued)

| Variable                       | (1) RAROA    |                | (2) RAROE    |                |
|--------------------------------|--------------|----------------|--------------|----------------|
|                                | Coefficients | <i>p-value</i> | Coefficients | <i>p-value</i> |
|                                | (1.493)      |                | (1.691)      |                |
| CAR                            | 0.140        | 0.149          | 0.130        | 0.170          |
|                                | (0.0967)     |                | (0.0952)     |                |
| LAR                            | 0.0258       | 0.591          | 0.04         | 0.377          |
|                                | (0.048)      |                | (0.0453)     |                |
| NPL                            | -1.033**     | 0.009          | -0.891*      | 0.034          |
|                                | (0.396)      |                | (0.420)      |                |
| LR                             | 0.0794*      | 0.022          | 0.0895**     | 0.006          |
|                                | (0.0346)     |                | (0.0327)     |                |
| CIR                            | -0.066***    | 0.000          | -0.072***    | 0.000          |
|                                | (0.013)      |                | (0.0148)     |                |
| IDIV                           | -3.767*      | 0.025          | -4.324**     | 0.005          |
|                                | (1.676)      |                | (1.536)      |                |
| <b>External Factors</b>        |              |                |              |                |
| HHI                            | 107.5**      | 0.003          | 88.30*       | 0.011          |
|                                | (35.960)     |                | (34.800)     |                |
| GDP                            | 0.125        | 0.061          | 0.142        | 0.074          |
|                                | (0.0664)     |                | (0.0794)     |                |
| INF                            | -0.260**     | 0.003          | -0.202**     | 0.003          |
|                                | (0.0874)     |                | (0.0683)     |                |
| IR_LONG                        | 2.040*       | 0.017          | 1.545        | 0.083          |
|                                | (0.854)      |                | (0.892)      |                |
| FIN                            | -1.573**     | 0.005          | -1.393*      | 0.017          |
|                                | (0.565)      |                | (0.584)      |                |
| _cons                          | -31.42*      | 0.032          | -32.09       | 0.058          |
|                                | (14.670)     |                | (16.950)     |                |
| Prob > F                       |              | 0.000***       |              |                |
| N                              | 60           |                | 60           |                |
| AR1                            | 0.105        |                | 0.230        |                |
| AR2                            | 0.79         |                | 0.917        |                |
| Sargan test ( <i>p-value</i> ) | 0.491        |                | 0.633        |                |

Source: Stata Output, 2025.

Notes: \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Source: Stata Output, 2025.

For external drivers, market concentration positively affects both RAROA and RAROE, while inflation and fintech lending have negative effects on both measures. GDP growth and long-term interest rates positively affect both RAROA and RAROE, although these effects are significant only at the 10% level. Overall, the results indicate that risk-adjusted profitability is strongly influenced by credit risk, liquidity, efficiency, income diversification, market concentration, inflation,

and fintech lending, with GDP growth and long-term interest rates offering weaker but still positive support.

### Hypothesis Testing Summary

A hypothesis is considered fully supported if its association is statistically significant and has the expected direction across all five profitability measures. It is considered partially supported if these conditions are met for at least one measure.

For nondirectional hypotheses, the direction of each estimated association is reported. Support is assessed using the significance level specified in the

table, with results significant at 5% distinguished from weaker evidence at 10%.

Table 7. Summary of Hypothesis Testing

| Hypothesis | Relationship                            | Significant outcome(s)                            | Decision            |
|------------|-----------------------------------------|---------------------------------------------------|---------------------|
| H1         | Bank size → Profitability               | ROAA (+)                                          | Partially supported |
| H2         | Capital adequacy → Profitability        | ROAA (+); ROAE (+)                                | Partially supported |
| H3         | Loan intensity → Profitability          | NIM (+)                                           | Partially supported |
| H4         | Credit risk → Profitability             | NIM (-); RAROA (-); RAROE (-)                     | Partially supported |
| H5         | Liquidity → Profitability               | ROAA (+); NIM (+); RAROA (+); RAROE (+)           | Partially supported |
| H6         | Cost-to-income ratio → Profitability    | ROAA (-); ROAE (-); NIM (-); RAROA (-); RAROE (-) | Supported           |
| H7         | Income diversification → Profitability  | ROAA (-); NIM (-); RAROA (-); RAROE (-)           | Partially supported |
| H8         | Market concentration → Profitability    | ROAE (+); RAROA (+); RAROE (+)                    | Partially supported |
| H9         | GDP growth → Profitability              | ROAA (+); RAROA (+); RAROE (+)                    | Partially supported |
| H10        | Inflation → Profitability               | ROAE (-); NIM (+); RAROA (-); RAROE (-)           | Partially supported |
| H11        | Long-term interest rate → Profitability | NIM (-); RAROA (+); RAROE (+)                     | Partially supported |
| H12        | Fintech lending → Profitability         | NIM (-); RAROA (-); RAROE (-)                     | Partially supported |

Source: Stata Output, 2025.

## Discussion

Differences in the profitability determinants of major Indonesian banks are identified across conventional and risk-adjusted measures. In particular, the findings on fintech lending and income diversification cannot be interpreted solely from the direction of their estimated coefficients. Therefore, the principal findings are discussed in relation to the theoretical framework and previous studies, while the observed associations are distinguished from their potential explanatory mechanisms.

Management efficiency is identified as one of the most consistent bank-specific determinants of profitability. A negative association is observed between the cost-to-income ratio and profitability, supporting the Efficient Structure Hypothesis, in which stronger bank performance is attributed to effective cost control and resource allocation (Demsetz, 1973; Khan et al., 2026; Maudos et al., 2002). This finding is also supported by previous evidence on the relationship between cost inefficiency and bank profitability (Horobet et al., 2021; Laporšek et al., 2024). An average cost-to-income ratio of 53.3% is recorded for the sample, indicating that a substantial proportion of operating income is absorbed by operating expenses. Thus,

operational efficiency is shown to be relevant to the profitability of the sampled major banks. However, the finding cannot be generalized as evidence that operational inefficiency characterizes the Indonesian banking sector as a whole.

Positive associations are identified between capital adequacy and both ROAA and ROAE, whereas no statistically significant associations are found for the risk-adjusted measures. Lending capacity and perceptions of financial soundness may be strengthened by a higher capital position (Laporšek et al., 2024; Pham et al., 2024; Priharto & Gani, 2023). However, the differences across profitability measures cannot be interpreted as evidence that capital adequacy affects return volatility. These differences may be explained by variations in portfolio composition and risk-taking, although these mechanisms require further empirical examination (Khoiriah et al., 2026).

A positive association is identified between loan intensity and NIM, whereas no statistically significant associations are observed with ROAA, ROAE, or risk-adjusted profitability. This finding is consistent with the income-generating role of lending as explained by Financial Intermediation Theory (Diamond, 1984; Gurley & Shaw, 1960). However, these estimates cannot determine whether

additional lending income is offset by lending costs or credit losses in the other profitability measures. Credit risk, as measured by non-performing loans, is negatively associated with NIM and both risk-adjusted measures, while no significant associations are found with ROAA or ROAE. This pattern may be influenced by provisioning practices or differences in income recognition, although these mechanisms are not directly examined in this study (Laporšek et al., 2024).

Liquidity is positively associated with selected profitability measures, consistent with its potential role in supporting funding capacity and resilience (Kurnia Yuniarti et al., 2024; Mashamba & Chikutuma, 2023). Holding excessive liquid assets may nevertheless involve a return trade-off when those assets earn relatively little income (Laporšek et al., 2024). A positive association with a risk-adjusted return ratio cannot, by itself, establish that liquidity reduces volatility: the result could reflect higher returns, lower volatility, or both. Separate analysis of returns and their volatility is needed to distinguish these possibilities.

External determinants also exhibit measure-specific associations. GDP growth is positively associated with ROAA, consistent with the possibility that stronger economic activity supports lending and asset-based returns (Laporšek et al., 2024; Saif-Alyousfi, 2022). Inflation and long-term interest rates show different relationships across profitability measures. Lending rates, funding costs, and asset-liability management may help explain these differences, but the relevant channels are not directly tested (Bernardelli & Carrasco-Gutierrez, 2024; Horobet et al., 2021; Kohlsheer et al., 2018; O'Connell, 2023).

Market concentration, measured by HHI, is positively associated with ROAE, RAROA, and RAROE, while its associations with ROAA and NIM are not significant. Market power could contribute to returns through pricing and funding costs, as suggested by the Structure-Conduct-Performance paradigm (Berger & Hannan, 1989). The Efficient Structure Hypothesis offers another explanation: more efficient banks may earn higher returns and gain market share. The HHI coefficients alone cannot distinguish these explanations. Nor can the associations with risk-adjusted measures establish whether concentration corresponds to more stable earnings or higher average returns

(Athanasoglou et al., 2008; Horobet et al., 2021; Petria et al., 2015).

Fintech lending has negative coefficients in the NIM and supplementary risk-adjusted models, whereas its associations with ROAA and ROAE are not significant at the 5% level. This pattern may reflect pressure exerted on lending margins by alternative credit providers (Ariffandi & Trinugroho, 2022; Elekdag, 2024; Phan et al., 2020). Borrower substitution, pricing adjustments, and earnings volatility may serve as potential transmission channels, although these mechanisms are not directly captured by the models. Furthermore, the insignificant associations with ROAA and ROAE cannot be interpreted as evidence that margin pressure has been offset by fee-based income, cost adjustments, or provisioning practices.

The findings demonstrate that different associations with the five profitability measures are exhibited by efficiency, risk, market conditions, and fintech lending. Therefore, distinct perspectives on the performance of the sampled banks are provided by conventional profitability indicators and return-to-volatility ratios. However, the supplementary risk-adjusted results should be interpreted only after the volatility calculations and estimation diagnostics have been adequately documented.

## CONCLUSION

The determinants of profitability among ten major Indonesian banks during the 2018–2024 period are examined using a dynamic panel framework. The findings indicate that bank-specific and external variables have different associations across conventional and risk-adjusted profitability measures. Management efficiency is the most consistent bank-specific determinant: a higher cost-to-income ratio is negatively associated with all five profitability outcomes. Credit risk, liquidity, and income diversification also show outcome-specific associations, underscoring the value of assessing performance using more than one indicator.

Among the external variables, market concentration and macroeconomic conditions are associated with selected profitability measures. Fintech lending has negative coefficients for NIM and the supplementary risk-adjusted measures, consistent with potential competitive pressure on banks. These estimates do not, however, directly

establish the channels through which fintech lending affects bank performance.

At the 5% significance level, H6 is supported across all five outcomes, whereas evidence for H1–H5 and H7–H12 varies by profitability measure. Significant coefficients for income diversification are negative in the ROAA, NIM, RAROOA, and RAROE models; this is consistent with the nondirectional formulation of H7, but calls for interpretation. Results significant only at the 10% level should be distinguished from those meeting the 5% threshold. Given the ten-bank, seven-year sample, the instrument-count concern, and the need to document the volatility calculations and estimation output for RAROOA and RAROE, the findings are best interpreted as conditional associations rather than causal effects.

#### IMPLICATIONS, LIMITATIONS, AND FUTURE RESEARCH

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The findings suggest that bank managers should assess operational efficiency, credit risk, and liquidity using both conventional and risk-adjusted profitability measures. The results for

income diversification warrant careful evaluation of whether non-interest activities generate returns commensurate with their costs.

As fintech lending continues to expand, digital innovation, strategic partnerships, and adjustments to lending practices may be considered by banks, although the effectiveness of these responses requires further empirical evaluation. For regulators, the simultaneous monitoring of bank performance, market competition, and digital lending development is emphasized by the findings. Evidence from Indonesia also contributes to the discussion of how established banks in emerging Asian markets operate amid changes in financial intermediation. However, the results cannot be generalized to the entire region.

This study is limited to ten major Indonesian banks observed from 2018 to 2024. In future research, the sample could be expanded to include smaller banks, additional Islamic banks, and digital banks. Governance quality, ESG performance, ownership structure, and digital transformation could also be examined as potential determinants of bank profitability.

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