

Do cross-border bank mergers and acquisitions lead to greater efficiency? Evidence from Indonesia

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ABSTRACT

This study investigates whether cross-border mergers and acquisitions enhance the efficiency of Indonesian private commercial banks, an issue that remains inconclusive in the emerging-market literature. The purpose of this research is to assess the impact of foreign ownership on efficiency and identify its key determinants, specifically by testing the validity of efficiency and synergy theories in an emerging market context. Quarterly financial data from 2017 to 2024 for 10 banks, 5 foreign-acquired and 5 non-acquired, are analyzed. Bank efficiency is measured using data envelopment analysis, which assesses technical, pure technical, and scale efficiency. To estimate causal effects, propensity score matching combined with a difference-in-differences approach is used, while Tobit regression is used to examine determinants of efficiency. The results show that cross-border mergers and acquisitions do not lead to statistically significant overall efficiency gains, despite heterogeneous effects across individual banks. Furthermore, bank size has a significant negative effect on efficiency, while profitability and capital adequacy exhibit mixed effects. These findings suggest that foreign acquisitions do not automatically improve bank efficiency, highlighting post-merger integration challenges. Theoretically, this study contributes by challenging the synergy theory, demonstrating that ownership transformation does not automatically yield operational synergies, and enriching the banking efficiency literature with a robust, high-frequency framework. In practice, these insights serve as a crucial strategic guideline for bank management to prioritize post-merger cultural and operational integration over simple scale expansion, while also assisting financial regulators in formulating more prudent cross-border banking acquisition policies.

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1. Introduction

Over the past decade, the global banking industry has undergone substantial consolidation and structural transformation. From a theoretical perspective, bank mergers and acquisitions are primarily motivated by efficiency and synergy considerations, as

emphasized in the efficiency theory of bank mergers and the synergy hypothesis. These theories argue that consolidation is expected to improve operational efficiency through economies of scale and scope, cost reduction, technology transfer, and the internalization of superior managerial practices (Paulet & Mavoori, 2021; Tsionas & Baltas, 2022).

Under efficiency theory, mergers and acquisitions enable acquiring banks to optimize resource allocation and enhance X-efficiency, ultimately improving performance and competitiveness. Accordingly, this study is explicitly grounded in efficiency and synergy theory as the primary theoretical lens for evaluating post-merger bank performance. This rationale became particularly prominent following the 2008 global financial crisis, when banks worldwide pursued mergers and acquisitions to strengthen their capital adequacy ratios, manage systemic risk, and comply with increasingly stringent regulatory frameworks such as Basel III. More recently, the coronavirus disease 2019 (COVID-19) pandemic and rapid adoption of financial technology have further accelerated consolidation as banks seek digital resilience and operational efficiency (Akhtar & Nosheen, 2022; Shabir et al., 2023). Over the past decade, the global banking industry has undergone substantial consolidation and structural transformation.

The Indonesian banking sector provides a compelling empirical setting to examine efficiency-driven cross-border mergers and acquisitions (M&As). Driven by regulatory consolidation incentives and digitalization, the industry has undergone massive structural shifts. Between 2017 and 2025, total assets expanded from IDR 7.387 trillion to IDR 12.726 trillion, while bank branches declined sharply from 32.276 to 21.035, signaling a strategic pivot toward automation. However, operational inefficiency remains a persistent challenge, as evidenced by a high industry-average operating expenses-to-operating income ratio of 86.09% in 2025. Against this backdrop, a wave of major cross-border acquisitions occurred between 2019 and 2020, including MUFG's acquisition of Danamon Bank, SMBC's takeover of BTPN Bank, Kookmin Bank's investment in Bukopin Bank, Bangkok Bank's acquisition of Permata Bank, and the merger of Agris and Mitraniaga Bank into IBK Indonesia Bank.

While these landmark transactions were strategic plays for regional expansion and domestic consolidation, they were heavily justified by the market based on efficiency and synergy theories, promising rapid technological upgrading, superior governance, and significant cost savings. Despite these corporate justifications, an empirical and theoretical gap persists in emerging market literature. Prior studies remain deeply inconclusive about whether foreign ownership genuinely translates into superior efficiency or triggers friction during post-merger integration. Furthermore, existing research heavily relies on low-frequency annual data and static methodologies that fail to capture immediate post-transaction dynamics. This study addresses these gaps by using high-frequency quarterly data (2017–2024) combined with a robust data envelopment analysis (DEA) and propensity score matching-difference-in-differences (PSM-DID) framework. This approach isolates the true causal impact of foreign acquisitions from macroeconomic shocks, providing a definitive empirical test of whether ownership transformation actually fulfills the promise of operational synergy.

Despite the growing body of literature on bank mergers and acquisitions, particularly in both developed and emerging markets, recent studies continue to yield mixed, context-dependent evidence regarding efficiency outcomes. Contemporary research highlights that post-merger efficiency gains are not automatic but depend on factors such as strategic alignment and integration processes. For instance, Tsionas and Baltas (2022) show that efficiency gains from bank mergers and acquisitions are highly contingent on risk-adjusted performance and organizational compatibility. Similarly, Al-Khasawneh et al. (2020) find that efficiency improvements in United States bank mergers vary across bank size and are mainly driven by technical efficiency rather than scale effects. Evidence from emerging markets also

confirms heterogeneous outcomes, where post-merger efficiency depends on managerial and operational factors (Saleh, 2022; Hakimi et al., 2024). Recent literature suggests that the impact of bank mergers on efficiency remains conditional on institutional settings and bank-specific characteristics.

In the Indonesian context, research on the consequences of cross-border bank acquisitions is especially sparse. While some studies investigate foreign ownership and financial performance (Arfianto et al., 2025), there is limited evidence explicitly linking foreign-led mergers and acquisitions to multiple dimensions of efficiency (technical efficiency/TE, pure technical efficiency/PTE, and scale efficiency/SE) using both frontier analysis and causal inference frameworks. Specifically, no comprehensive study has applied data envelopment analysis, combined with propensity score matching and difference-in-differences, to isolate the effect of mergers on changes in efficiency over time in Indonesian banks.

This gap is important given Indonesia's unique banking structure, rapid consolidation driven by regulatory reforms, and the increasing role of foreign capital, which may yield different efficiency dynamics than in other emerging markets. Therefore, this study addresses this gap by providing rigorous, high-frequency quarterly evidence of the causal effects of cross-border mergers and acquisitions on bank efficiency in Indonesia from 2017 to 2024. This study addresses these gaps by evaluating whether cross-border acquisitions genuinely improve the operational efficiency of Indonesian private commercial banks. Beyond its robust methodology, the core theoretical novelty of this study lies in reconceptualizing the boundary conditions of the synergy and efficiency theories within the institutional environment of an emerging market. Traditional M&A theories, primarily developed in mature Western markets, assume that capital strength and superior foreign governance automatically transfer into efficiency gains.

However, this study challenges this linear assumption by introducing a granulated theoretical lens that separates operational synergy into three distinct dimensions: technical, purely technical, and scale efficiency. By decoupling these dimensions using a high-frequency (quarterly) timeframe, the study isolates how institutional friction and post-merger integration challenges in a highly regulated emerging market can disrupt the expected transmission mechanisms of the efficiency theory. Consequently, it shifts the academic debate from whether foreign acquisitions create synergy to how and why specific efficiency components respond differently to ownership transformation amid structural and regulatory shifts. Focusing on five foreign-acquired banks, Danamon Bank, BTPN Bank, Bukopin Bank, Permata Bank, and IBK Indonesia Bank, this research utilizes quarterly data from 2017 to 2024. Bank efficiency is measured using data envelopment analysis, decomposed into TE, PTE, and SE.

2. Literature Review and Hypothesis Development

2.1. Literature Review

2.1.1. Efficiency, Synergy, and Financial Intermediation in Bank Mergers and Acquisitions

This study is theoretically grounded in efficiency, synergy, and post-merger integration theories, which together explain why mergers and acquisitions are pursued in the banking sector and why efficiency outcomes may vary across institutions and over time (Gulamhussen et al., 2016; Anagnostopoulos et al., 2024). Synergy theory operates at the macro-strategic level, focusing on ex ante valuation and corporate intent behind cross-border M&A. It posits that the combination of two distinct banking entities will create a new institution whose value and performance exceed the sum of its independent parts. In our framework, synergy theory serves as the justification engine: it explains why foreign investors acquire Indonesian private

banks. This theory assumes that synergy is achieved through two distinct mechanisms: Operating synergies, cost reductions through economies of scale, and revenue enhancement through cross-selling or technological deployment. Financial synergies, lower cost of capital achieved by merging uncorrelated cash flows or expanding the institutional footprint.

Efficiency theory operates at the microeconomic level, providing concrete, quantitative benchmarks for evaluating whether the strategic promises of synergy theory are actually achieved. Unlike synergy theory, which looks at market value and joint gains, efficiency theory focuses strictly on input-output optimization and managerial performance. In this study, efficiency theory dictates the use of data envelopment analysis (DEA) to deconstruct bank performance into three rigorous dimensions: Technical efficiency (TE): The bank's capacity to maximize outputs (e.g., loans, investments) from a given set of inputs (e.g., deposits, labor, capital). Pure technical efficiency (PTE): An indicator of purely managerial skill in utilizing operational resources, isolating external structural constraints. Scale efficiency (SE): An indicator of whether the bank is operating at its optimal size or if it is suffering from constant, increasing, or decreasing returns to scale.

Post-merger integration (PMI) theory operates at the organizational-behavioral level, serving as the critical ex-post moderator explaining the gap between theoretical synergy and actual economic efficiency. While synergy theory assumes immediate value creation and efficiency theory measures the final state of optimization, PMI theory introduces the variable of time and friction. It argues that efficiency outcomes are conditional on how well the surviving entity manages. System Harmonization: The complex process of aligning information technology infrastructures, digital banking platforms, and risk management systems. Cultural and Governance Adaptation: Resolving institutional friction when foreign management frameworks are superimposed onto domestic banking cultures. Transitional Inefficiencies: Explaining why efficiency often drops in the short term due to restructuring shocks, organizational disruption, and high integration costs before any long-term synergy can be realized.

According to efficiency theory, bank mergers are motivated by the objective of improving operational performance through better resource allocation, cost minimization, and the internalization of superior managerial practices (Paulet & Mavoori, 2021; Badunenko et al., 2022). In this framework, mergers and acquisitions enable acquiring banks to enhance X-efficiency by eliminating redundant operations, adopting advanced risk management systems, and improving monitoring and screening mechanisms. Efficiency theory, therefore, predicts that successful mergers should lead to higher technical and managerial efficiency, particularly when acquirers possess superior technology or governance structures.

Closely related, synergy theory emphasizes that mergers create value when the combined entity generates greater efficiency than the sum of the pre-merger firms. In banking, such synergies may arise from economies of scale and scope, diversification of income sources, shared technological platforms, and access to broader funding networks. Cross-border bank mergers and acquisitions are expected to generate synergies through the transfer of advanced banking technologies, international best practices, and stronger corporate governance from foreign acquirers to domestic target banks (Chakraborty & Das, 2024).

However, both efficiency and synergy theories acknowledge that efficiency gains are not automatic. This limitation is addressed by post-merger integration theory, which argues that merger outcomes critically depend on the effectiveness of

organizational, technological, and cultural integration processes (Steigenberger, 2017). In the banking context, integration challenges, differences in risk culture, regulatory frictions, and managerial resistance can generate substantial short-term inefficiencies that offset potential efficiency gains. As a result, mergers may initially reduce technical and managerial efficiency before improvements materialize in the longer term (Steigenberger, 2017; Akhtar & Nosheen, 2022; Delis et al., 2022).

Recent empirical studies support this theoretical synthesis. Some studies find that bank mergers improve cost and technical efficiency (Al-Khasawneh et al., 2020; Hakimi et al., 2024). Others report mixed or context-dependent effects depending on bank characteristics and post-merger adjustments (Wendha & Alteza, 2020). These mixed findings suggest that merger-induced efficiency gains are conditional, shaped by bank size, capitalization, risk structure, and the quality of post-merger integration.

Taken together, efficiency theory, synergy theory, and post-merger integration theory provide a coherent framework for this study. They justify examining not only the average efficiency effects of cross-border mergers and acquisitions but also the heterogeneous role of bank-specific characteristics, such as size, CAR, profitability, and risk, in shaping efficiency outcomes. This integrated theoretical perspective directly informs the development of the study's hypotheses and empirical strategy.

2.1.2. Cross-Border Bank Mergers and Acquisitions: Empirical Evidence and Synthesis

Empirical research on cross-border bank mergers and acquisitions and efficiency can be broadly synthesized into three interrelated strands. The first strand documents efficiency improvements, particularly in emerging markets, where foreign acquirers introduce advanced technology, stronger governance, and superior risk management practices. Studies in this stream find that foreign-led acquisitions can enhance cost efficiency and productivity by modernizing operations and improving managerial discipline (Pinto et al., 2017; Ahmed et al., 2023; Chiaramonte et al., 2023).

A second strand reports insignificant or negative efficiency effects, especially in the short run. These studies highlight post-merger integration costs, organizational complexity, and cultural frictions as key obstacles to realizing efficiency gains. More recent evidence from advanced banking systems suggests that efficiency losses often emerge immediately after mergers due to system integration challenges, digital infrastructure mismatches, workforce restructuring, and coordination frictions (Duan et al., 2021).

A third strand emphasizes heterogeneity in outcomes, arguing that efficiency effects depend on bank size, capitalization, risk exposure, and institutional environment (Lee et al., 2016; Grzeta et al., 2023). Recent studies show that larger and better-capitalized banks are better able to absorb integration shocks and ultimately translate mergers into efficiency gains, whereas weaker banks may experience prolonged inefficiencies (Zhu, 2023; Fonseka & Al Farooque, 2024). Taken together, the literature suggests that cross-border mergers and acquisitions are potentially efficiency-enhancing, but outcomes are conditional rather than universal. This mixed evidence underscores the need for a context-specific and methodologically robust analysis, particularly in emerging markets like Indonesia, where regulatory reforms, foreign ownership, and digital transformation interact to shape post-merger efficiency.

2.1.3. Banking Efficiency

Bank efficiency refers to the ability of banks to transform inputs into outputs effectively, and it is commonly measured using frontier techniques such as data

envelopment analysis. Data envelopment analysis is widely applied in banking research because it allows the evaluation of efficiency without requiring a predefined functional form and accommodates multiple inputs and outputs (Oukil, 2024; Skvarciany & Jurevičienė, 2024; Wang et al., 2024). In empirical banking studies, data envelopment analysis is frequently extended into advanced models, including dynamic and network data envelopment analysis, to capture the multi-stage nature of banking operations and changes in efficiency over time (Mercan et al., 2003; Dar et al., 2021; Wang et al., 2024).

Beyond measurement, recent empirical studies emphasize that internal risk and management factors influence bank efficiency. One of the most consistently validated determinants is credit risk. Non-performing loans (NPL) have been shown to negatively affect bank efficiency, as higher NPL levels increase operational costs and reduce the effectiveness of financial intermediation (Phung et al., 2022). Furthermore, bank capitalization plays an important moderating role. Higher capital levels can mitigate the negative impact of NPLs on efficiency, indicating that well-capitalized banks are better able to absorb risk and maintain operational performance (Phung et al., 2022).

In addition, managerial behavior also affects efficiency outcomes. Evidence shows that practices such as earnings management negatively affect bank efficiency by distorting financial reporting and reducing the quality of resource allocation (Wang et al., 2014; Dar et al., 2021; Proença et al., 2023). Bank efficiency is also closely linked to core performance indicators used in banking supervision frameworks. Variables such as profitability, capital adequacy ratio, asset quality, and liquidity are commonly associated with differences between efficient and inefficient banks, particularly in the context of financial distress and bank failure (Samad & Armstrong, 2022). Overall, the literature indicates that bank efficiency is a multidimensional concept shaped by operational performance, risk management, and financial structure, where credit risk and managerial quality emerge as the most consistent determinants across empirical studies.

2.2. Hypothesis Development

2.2.1. Positive Effect of Mergers and Acquisitions on Bank Efficiency

Efficiency theory and synergy theory posit that mergers and acquisitions are undertaken to improve firm performance through cost reduction, economies of scale and scope, and the transfer of superior managerial practices and technology. In banking, these mechanisms are expected to enhance operational efficiency, particularly technical and scale efficiency, as consolidated institutions optimize resource allocation and production processes (Adesina, 2019). Recent empirical evidence from emerging and Asian banking markets suggests that foreign-led mergers and acquisitions can improve efficiency through enhanced governance, digital capability transfer, and risk management, although short-term integration costs may delay these gains (Ahmed et al., 2023; Chiaramonte et al., 2023; Zhu & Hatakeda, 2023). This implies that while efficiency gains may not be immediate, mergers and acquisitions are fundamentally driven by long-term efficiency considerations. **H₁: Mergers and Acquisitions Have a Positive Effect on Bank Efficiency.**

2.2.2. Positive Effect of Bank Size on Bank Efficiency

Within the efficiency theory framework, bank size is a key determinant of operational efficiency. Larger banks are expected to benefit from economies of scale and scope, enabling them to spread fixed costs, invest in advanced technologies, and

diversify risks more effectively (Sufian & Habibullah, 2010; Fang et al., 2025). Empirical studies consistently find a positive association between size and efficiency, particularly in emerging markets where larger banks possess superior access to capital, technology, and managerial expertise (Zhu & Hatakeda, 2023; Fonseka & Al Farooque, 2024). Although excessive size may introduce bureaucratic and coordination costs, recent evidence suggests that the net effect remains positive, especially when supported by strong governance and digital infrastructure. **H₂: Bank Size Has a Positive Effect on Bank Efficiency.**

2.2.3. Positive Effect of Capital Adequacy Ratio, Profitability, and Net Interest Margin on Bank Efficiency

According to financial intermediation theory, banks act as intermediaries that transform deposits into loans while managing risk and information asymmetry. In empirical banking studies, efficiency is closely related to bank performance, risk management, and financial structure. Recent international evidence highlights that CAR plays a critical role in bank stability and performance. Demirgüç-Kunt et al. (2021) show that well-capitalized banks performed better during periods of economic stress, indicating that stronger capital positions support more resilient and effective banking operations. This suggests that capital adequacy can contribute to efficiency indirectly through improved stability and risk management.

Profitability, measured by return on assets (ROA), is consistently associated with bank efficiency in empirical literature. Studies show that banks with higher profitability tend to operate more efficiently due to better cost control and resource utilization. This relationship is widely supported in banking efficiency studies using international datasets (e.g., European banking systems), where efficient banks are also more profitable. Net interest margin (NIM) reflects the pricing of banking intermediation services. According to Claessens et al. (2018), net interest margins are influenced by competition, interest rate environments, and bank-specific characteristics. While higher NIM may indicate stronger intermediation performance, it may also reflect lower competition, so its relationship with efficiency is not always direct; nonetheless, it remains relevant as an indicator of banking performance. **H₃: Capital Adequacy Ratio, Profitability, and Net Interest Margin Has a Positive Effect on Bank Efficiency.**

2.2.4. Negative Effect of Non-Performing Loans and Loan-to-Deposit Ratio on Bank Efficiency.

Credit and liquidity risks are major sources of inefficiency in banking operations. High non-performing loans (NPL) indicate weak credit screening and monitoring, increasing provisioning costs, and reducing productive lending capacity, thereby undermining technical and managerial efficiency (Chortareas et al., 2012; Fonseka & Al Farooque, 2024). Similarly, excessive loan-to-deposit ratios (LDR) reflect liquidity pressure and aggressive lending strategies that may raise funding costs and impair operational efficiency. Empirical evidence from emerging markets consistently reports a negative association between risk indicators and bank efficiency (Ahmed et al., 2023). **H₄: Non-Performing Loans and Loan-to-Deposit Ratio Have a Negative Effect on Bank Efficiency.**

The analysis follows a sequential process that integrates all methods into a single framework, as shown in Figure 1. Data envelopment analysis first measures baseline efficiency for each bank. Propensity score matching then ensures comparability between merging and non-merging banks by matching them on observable characteristics.

Difference-in-differences (DiD) is applied to capture efficiency changes attributable to mergers and acquisitions over time, while Tobit regression identifies financial determinants influencing efficiency outcomes.

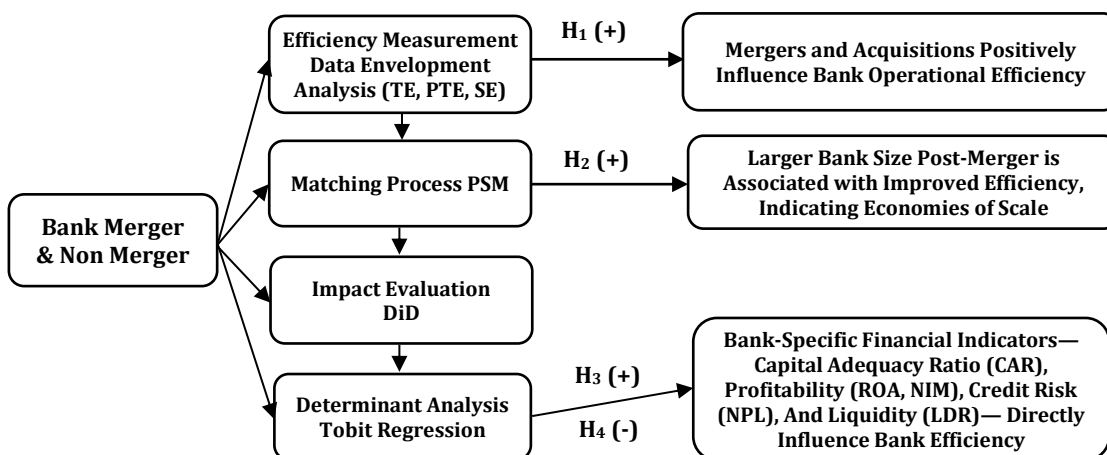


Figure 1. Research Framework

3. Research Methods

3.1. Types and Sources of Data

The study utilizes quarterly panel data from 2017 to 2024 covering ten Indonesian private commercial banks. Five banks constitute the treatment group, each experiencing a foreign-led merger or acquisition during 2019–2020: BTPN Bank (Sumitomo Mitsui Banking Corporation, Japan), Danamon Bank (MUFG Bank, Japan), Permata Bank (Bangkok Bank, Thailand), IBK Indonesia Bank (Industrial Bank of Korea), and KB Bukopin Bank (KB Kookmin Bank, South Korea). The control group consists of five private national banks, Panin Bank, Mayapada Bank, Mega Bank, Victoria Bank, and Sinarmas Bank, which did not engage in any mergers and acquisitions during the same period.

The sample period includes three years before and three years after the merger events, allowing sufficient time to observe pre-merger trends and post-merger adjustment effects. This window is commonly used in M&A studies to capture both short- and medium-term efficiency changes while minimizing contamination from unrelated structural shocks. All data are obtained from publicly available sources, including the Financial Services Authority, the Indonesia Stock Exchange, and banks' quarterly financial statements.

3.2. Data Collection and Variable Construction

3.2.1. Data Envelopment Analysis

Data envelopment analysis is employed as the primary tool to measure bank efficiency because it allows evaluation of multiple inputs and outputs without imposing a specific functional form on the production process. This non-parametric approach is widely used in banking studies because it accommodates the complexity of financial intermediation. Consistent with recent banking efficiency literature, this study applies an input-oriented variable returns to scale (VRS) model, reflecting the assumption that banks have greater control over inputs than outputs and aim to minimize resource usage while maintaining service levels. The VRS specification further allows for differences in bank size and operational scale, making it particularly suitable for heterogeneous banking systems (Henriques et al., 2018; Omrani et al., 2023).

Data envelopment analysis generates three efficiency indicators: TE, PTE, and SE. This decomposition enables the distinction between inefficiency arising from managerial performance and that resulting from operating at a non-optimal scale. Such a framework is particularly relevant in banking studies, where inefficiency may stem from both managerial limitations and structural constraints. Recent empirical studies confirm that data envelopment analysis remains one of the most widely applied methods for evaluating bank efficiency across countries, as it provides a flexible and robust framework for comparing how effectively banks transform inputs (e.g., labor, capital, deposits) into outputs (e.g., loans and income) (Henriques et al., 2018; Khan & Gulati, 2021; Omrani et al., 2023). The resulting efficiency scores are therefore used as the dependent variables in subsequent causal and regression analyses.

This study applies an input-oriented VRS model, focusing on minimizing resource use while maintaining output levels, an appropriate approach for banking, where cost control and resource allocation are key to efficiency. Inputs include fixed assets, operating expenses (excluding interest), and third-party funds (deposits), while outputs consist of interest income, non-interest income, and total loans. The analysis is conducted quarterly from 2017 to 2024 using MAXDEA software, producing three efficiency indicators: technical efficiency (TE) – overall efficiency under constant returns to scale (CRS); pure technical efficiency (PTE) – managerial efficiency under VRS; and scale efficiency (SE) – efficiency due to scale of operation. If $SE < 1$, the bank operates at a non-optimal scale, indicating either increasing or decreasing returns to scale.

3.2.2. Propensity Score Matching

Because banks self-select into merger activity, direct comparisons between merged and non-merged banks may be subject to selection bias. To address this issue, propensity score matching (PSM) is employed to construct a comparable control group based on pre-merger characteristics (Rosenbaum & Rubin, 1983). Propensity scores are estimated using a probit model, where the probability of being involved in a merger is conditioned on observable bank characteristics, including bank size (log total assets), CAR, ROA, NIM, LDR, and NPL:

$$P(T_i = 1 | X_i) = \Phi(\beta_0 + \beta_1 \text{Bank Size}_i + \beta_2 \text{CAR}_i + \beta_3 \text{ROA}_i + \beta_4 \text{NIM}_i + \beta_5 \text{LDR}_i + \beta_6 \text{NPL}_i)$$

where T is a binary treatment indicator (1 = merged bank, 0 = non-merged bank), and Φ denotes the cumulative normal distribution function. Matching is implemented using Nearest Neighbor Matching (one neighbor with a 0.05 caliper) and Kernel Matching to ensure robustness. The average treatment effect on the treated (ATT) is computed as:

$$ATT = E[Y(1) - Y(0) | T = 1]$$

Balance diagnostics confirm that covariate differences between merged and non-merged banks are substantially reduced after matching. Only matched observations are retained for subsequent DiD and Tobit regressions, ensuring that estimated effects reflect merger impacts rather than pre-existing structural differences.

3.2.3. Difference-in-Differences

The Difference-in-differences (DiD) approach is applied to the matched sample to estimate the causal impact of foreign-led mergers and acquisitions on bank

efficiency. By comparing efficiency changes before and after mergers between treated and control banks, DiD isolates the merger effect while controlling for time-invariant bank heterogeneity and common macroeconomic shocks. The inclusion of bank fixed effects and time fixed effects strengthens internal validity, while interaction terms allow the analysis to capture heterogeneous effects related to bank size. The baseline DiD regression model is specified as:

$$\text{Efficiency}_{it} = \alpha_i + \gamma_t + \beta_1 \text{DiD}_{it} + \beta_2 (\text{Bank Size}_{it}) + \beta_3 (\text{DiD}_{it} \times \text{Bank Size}_{it}) + \beta_4 \text{CAR}_{it} + \beta_5 \text{ROA}_{it} + \beta_6 \text{NIM}_{it} + \beta_7 \text{LDR}_{it} + \beta_8 \text{NPL}_{it} + \varepsilon_{it}$$

where Efficiency_{it} represents bank efficiency (TE, PTE, or SE) for the bank i at time t ; α_i captures bank-specific fixed effects; γ_t denotes time fixed effects; and ε_{it} is the error term. The variable DiD_{it} equals one for treated banks in the post-merger period and zero otherwise. The coefficient β_1 measures the average treatment effect of foreign-led mergers and acquisitions on bank efficiency, while β_3 captures heterogeneous effects conditional on bank size. Coefficients β_4 to β_8 control for differences in capital adequacy, profitability, and risk conditions across banks. The model is estimated separately for TE, PTE, and SE to distinguish between overall, managerial, and scale-related efficiency effects.

3.2.4. Tobit Regression

The Difference-in-differences (DiD) approach is applied to the matched sample to estimate the causal impact of foreign-led mergers and acquisitions on bank efficiency. By comparing efficiency changes before and after mergers between treated and control banks, DiD isolates the merger effect while controlling for time-invariant bank heterogeneity and common macroeconomic shocks. The inclusion of bank fixed effects and time fixed effects strengthens internal validity, while interaction terms allow the analysis to capture heterogeneous effects related to bank size. The DiD framework thus provides a rigorous identification strategy consistent with the study's causal objectives. The latent model is expressed as:

$$\text{Efficiency}_i^* = \beta_0 + \beta_1 \text{Bank Size}_i + \beta_2 \text{CAR}_i + \beta_3 \text{ROA}_i + \beta_4 \text{NIM}_i + \beta_5 \text{LDR}_i + \beta_6 \text{NPL}_i + \varepsilon_i$$

Each regression is estimated separately for TE, PTE, and SE using only matched banks. This ensures that differences in efficiency determinants reflect post-merger adjustments rather than pre-merger disparities.

4. Results and Discussion

4.1. Efficiency Scores Measured through Data Envelopment Analysis

Bank efficiency was initially evaluated using the data envelopment analysis approach for the period 2017–2024. The efficiency of each bank was assessed across three dimensions, TE, PTE, and SE, to capture overall performance, managerial capability, and scale optimization, respectively. The analysis compares efficiency trends between merged and non-merged private commercial banks. The data envelopment analysis results provide preliminary evidence on whether cross-border mergers are associated with efficiency improvements, thereby offering an initial assessment of the first hypothesis, which predicts a positive effect of mergers and acquisitions on bank efficiency.

4.1.1. Efficiency Trends of Merged vs. Non-Merged Banks (2017–2024)

Figure 2 illustrates the evolution of average efficiency scores for merged and non-merged private commercial banks over the 2017–2024 period. The efficiency measures are estimated using data envelopment analysis based on bank-level financial

data obtained from the Indonesian Banking Statistics published by the Financial Services Authority. Prior to the merger wave in 2019–2020, both groups displayed relatively stable efficiency levels. Notably, banks that subsequently engaged in mergers exhibit marginally higher TE and SE, suggesting that more efficient institutions are more likely to participate in consolidation. This evidence supports the self-selection hypothesis, whereby relatively stronger banks initiate or attract merger activity due to superior managerial capabilities and resource endowments (Fang et al., 2025).

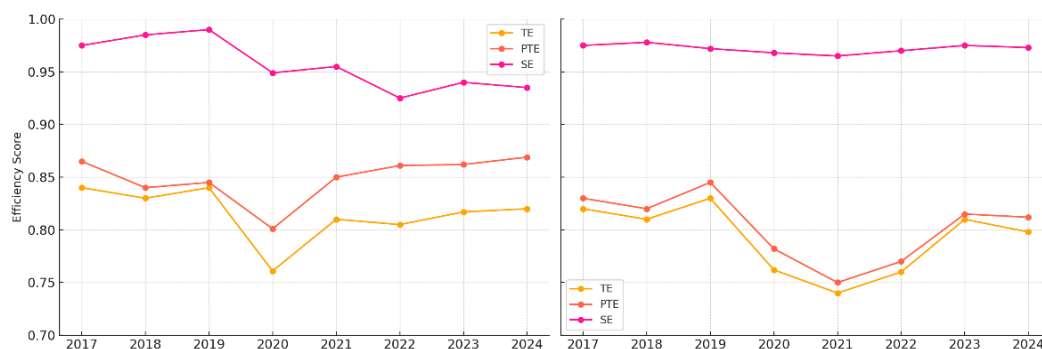


Figure 2. Efficiency Scores for Merged and Non-Merged Banks (2017–2024)

A pronounced efficiency contraction is observed in 2020 across both groups, coinciding with the onset of the COVID-19 pandemic and the immediate post-merger integration phase. This decline reflects the combined effects of macroeconomic shocks and merger-related adjustment costs, including organizational restructuring, system integration, and coordination frictions. Consistent with recent empirical evidence, bank efficiency tends to deteriorate in the short run following mergers and acquisitions, particularly under conditions of heightened systemic uncertainty (Bertay et al., 2013; Chiaramonte et al., 2023).

From 2021 onward, efficiency trajectories diverge markedly between the two groups. Merged banks exhibit faster, more persistent recoveries in TE and PTE, outperforming their non-merged counterparts. By 2024, the average TE and PTE of merged banks will reach approximately 0.820 and 0.869, respectively, suggesting substantial improvements in managerial quality and operational effectiveness following the stabilization of integration processes. This pattern is consistent with the dynamic efficiency perspective, which posits that the benefits of bank consolidation materialize gradually as integration costs decline and are replaced by organizational learning, technological upgrading, and governance improvements (Demirgüç-Kunt et al., 2021; Ahmed et al., 2023).

In contrast, non-merged banks exhibit a slower, less consistent recovery trajectory, suggesting that merger participation, particularly when involving foreign ownership, facilitates access to superior technological capabilities, capital resources, and risk management practices that enhance long-term efficiency. However, improvements in SE among merged banks remain limited and volatile throughout the sample period. This suggests that while managerial and technical efficiencies can adjust relatively quickly, achieving optimal scale is inherently more complex and path-dependent. Recent evidence indicates that transitional inefficiencies often accompany post-merger scale optimization before economies of scale are fully realized (Badunenko et al., 2022; Chiaramonte et al., 2023; Fonseka & Al Farooque, 2024). Overall, these trend-level data envelopment analysis results suggest that cross-border mergers do not generate immediate efficiency gains, partially contradicting the short-

term predictions of efficiency and synergy theories, but lending support to their long-run implications.

4.1.2. Bank-Level Efficiency Comparisons: Pre vs. Post 2020

Figure 3 provides a complementary perspective by comparing bank-level efficiency scores between the pre-merger period (2017–2019) and the post-merger period (2020–2024), highlighting substantial cross-sectional heterogeneity in post-merger efficiency outcomes. In contrast to the aggregate trends presented in Figure 2, this comparison reveals that efficiency gains are not uniformly distributed across banks. Instead, the results suggest that post-merger performance is highly bank-specific and depends critically on factors such as integration effectiveness, strategic alignment, and institutional compatibility, rather than ownership change alone (Shaban & James, 2018; Irwin et al., 2022).

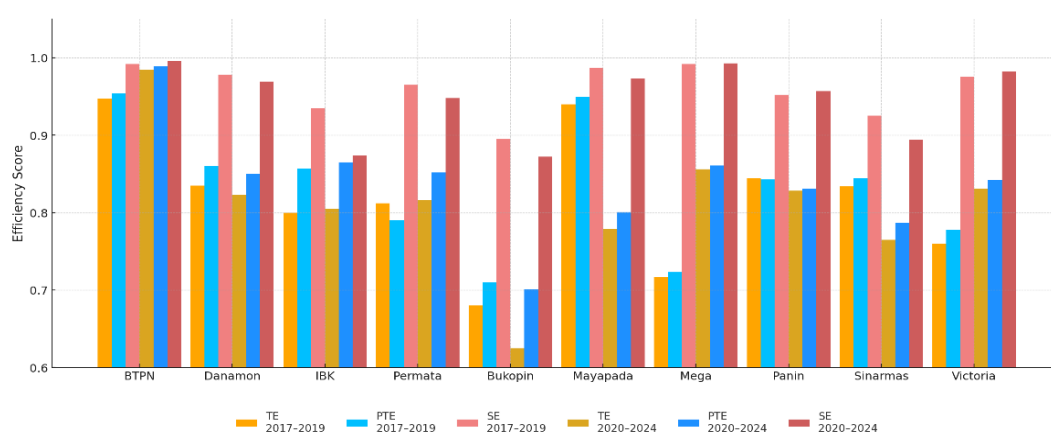


Figure 3. Bank Efficiency Scores by Period (2017–2019 versus 2020–2024)

Among the merged banks, BTPN Bank recorded the most substantial improvement in efficiency following its merger with Sumitomo Mitsui Banking Corporation. This positive outcome aligns with BTPN’s successful digital transformation and integration of Japanese management practices that emphasized technological innovation and cost efficiency. In contrast, KB Bukopin Bank and IBK Indonesia Bank experienced declines in efficiency after their respective mergers with KB Kookmin Bank and IBK Korea. These results likely reflect integration challenges, including operational restructuring, asset quality issues, and cultural adaptation between the parent and subsidiary institutions. Permata Bank, after being acquired by Bangkok Bank in 2020, showed improvement in PTE, signaling enhanced managerial efficiency, while its SE slightly decreased, suggesting the need for scale adjustments to align with new strategic orientations. Bank Danamon, acquired by MUFG Bank, showed only modest efficiency gains, possibly due to the prolonged transition and harmonization process under Japanese ownership.

Among non-merged banks, Mega Bank and Victoria Bank showed gradual efficiency improvements over the study period, primarily driven by internal modernization and digitalization initiatives. Conversely, Mayapada Bank and Sinarmas Bank experienced declines in efficiency, attributable to rising credit risk exposure and deteriorating asset quality, especially during the pandemic years. From a theoretical standpoint, these heterogeneous outcomes challenge the assumption, embedded in synergy theory, that mergers uniformly generate efficiency gains. Instead, the data envelopment analysis evidence supports a conditional efficiency hypothesis, whereby

efficiency improvements depend on effective post-merger integration, institutional compatibility, and managerial execution. Accordingly, the data envelopment analysis results provide partial and qualified support for the first hypothesis: cross-border mergers do not automatically improve bank efficiency, and their impact varies across efficiency dimensions and individual banks.

4.2. Propensity Score Matching Balance Test

To mitigate potential selection bias stemming from differences in pre-merger characteristics, PSM was employed. The core logic of PSM is to construct a counterfactual group of non-merged banks that are observationally similar to merged banks based on pre-merger characteristics, thereby isolating efficiency differences attributable to merger participation rather than pre-existing conditions.

4.2.1. Determinants of Merger Participation

Table 1 reports the probit regression results used to estimate propensity scores. The findings indicate that merger participation was not random. Banks with higher CAR, NIM, and LDR were significantly more likely to engage in mergers, whereas ROA showed a significant negative association with merger likelihood. Bank size and NPL were not statistically significant predictors.

Table 1. Probit Regression Results for Estimating Propensity Scores

Variable	Coefficient	Std. Error	z	p-value
Bank Size	0.1049	0.1021	1.03	0.304
CAR	0.0554***	0.0133	4.16	0.000
ROA	-0.5591***	0.1458	-3.84	0.000
NIM	0.1861**	0.0621	2.99	0.003
LDR	0.0479***	0.0066	7.22	0.000
NPL	-0.0365	0.0686	-0.53	0.595
Constant	-7.3298***	1.9068	-3.84	0.000

Model statistics: Pseudo-R² = 0.357; LR Chi² = 158.56; Prob > Chi² = 0.000; Observations = 320.

Note: ***p < 0.01, **p < 0.05, *p < 0.10

These results suggest that foreign acquirers tend to target banks with strong capitalization and active intermediation capacity, consistent with efficiency-seeking behavior and strategic asset acquisition motives emphasized in the recent merger literature (Ahmed et al., 2023; Chiaramonte et al., 2023). Such patterns indicate that well-capitalized institutions with higher lending activity are perceived as more attractive due to their capacity to generate synergies, facilitate technology transfer, and support post-merger integration.

The negative coefficient on ROA further indicates that less profitable banks are systematically less likely to become merger targets. This finding highlights the non-random nature of merger participation and provides strong evidence of selection effects in the sample. Consequently, failing to account for this selection bias may lead to upward bias in estimates of post-merger efficiency gains. This reinforces the need for appropriate econometric strategies, such as matching or treatment effect models, to isolate the causal impact of mergers on bank efficiency (Yuan et al., 2023).

4.2.2. Common Support and Covariate Balance

Following the estimation of propensity scores, observations were classified into common and off-support regions to ensure valid comparability between treated (merged) and control (non-merged) banks. As shown in Table 2, out of 320 total observations, 261 fell within the common support region, comprising 101 treated and

160 control observations. Meanwhile, 59 treated observations were off support, meaning their propensity scores were outside the overlap range and thus excluded from subsequent matching. This substantial overlap confirms that an appropriate comparison group exists and that PSM is feasible in this context.

Table 2. Distribution of Observations in Common Support

Group	Off Support	On Support	Total
Treated	59	101	160
Control	0	160	160
Total	59	261	320

After applying both Nearest Neighbor and Kernel Matching with a caliper of 0.05, the balance diagnostics in Tables 3 and 4 show improved covariate balance. Mean standardized bias declined from 39.9% before matching to 10.7% after matching, while the pseudo-R² dropped sharply from 0.357 to 0.030. Similarly, the likelihood ratio chi-square statistic decreased from 158.56 to 8.47 and became statistically insignificant (p = 0.205), indicating that systematic differences between merged and non-merged banks were largely eliminated.

Key financial variables, particularly CAR, ROA, and LDR, experienced bias reductions exceeding 70%, confirming that the matching procedure effectively aligned pre-merger characteristics. Although NPL exhibited some residual imbalance, its overall influence was limited, and no covariate showed economically meaningful differences after matching. Collectively, these diagnostics confirm the robustness of the matched sample and support its use in subsequent ATT and DiD estimation.

Table 3. Covariate Balance Before and After Matching

Variable	% Bias (Before)	% Bias (After)	Bias Reduction	p-value (After)
Bank Size	12.4	8.3	33.0%	0.562
CAR	50.2	14.8	70.6%	0.303
ROA	-45.2	6.8	84.9%	0.278
NIM	-5.4	5.7	-5.5%	0.681
LDR	119.7	-3.1	97.4%	0.657
NPL	6.5	-25.4	-292.1%	0.012*

Note: ***p < 0.01, **p < 0.05, *p < 0.10

Table 4. Summary Statistics for Covariate Balance

Statistic	Before Matching	After Matching
Pseudo R ²	0.357	0.030
LR Chi ²	158.56	8.47
p-value	0.000	0.205
Mean Bias (%)	39.9	10.7
Median Bias (%)	28.8	7.6
B (Variance Ratio)	138.4	41.7
R	4.44	1.46

4.2.3. Average Treatment Effect on the Treated

Using the matched sample, Table 5 reports the ATT for the three data-envelopment-analysis efficiency measures. The results indicate that post-merger differences in TE and PTE between merged and non-merged banks are statistically insignificant. This finding suggests that, on average, mergers did not generate

immediate improvements in operational or managerial efficiency relative to comparable non-merged banks.

In contrast, SE exhibits a small but statistically significant decline among merged banks (ATT = -0.0129, $p < 0.05$). Although quantitatively modest, this effect corresponds to an average reduction of approximately 1.3 percentage points in scale efficiency, indicating that merged banks operated farther from their optimal production scale in the post-merger period. From an economic perspective, even small efficiency losses can be significant in the banking sector, as they may translate into higher operating costs, suboptimal branch networks, and inefficient asset utilization.

Table 5. Average Treatment Effect on the Treated Data Envelopment Analysis

Efficiency Measure	Treated (Matched)	Control (Matched)	ATT (Difference)	Std. Error	T-Statistic
TE	0.8167	0.8206	-0.0040	0.0243	-0.16
PTE	0.8442	0.8354	0.0087	0.0247	0.35
SE	0.9693	0.9822	-0.0129**	0.0056	-2.30

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

This result aligns with prior empirical evidence suggesting that scale-related efficiency gains from bank mergers tend to materialize more slowly than managerial improvements, particularly when integration involves branch rationalization, IT consolidation, and organizational restructuring (Chiaramonte et al., 2023; Yuan et al., 2023). Overall, the PSM and ATT results provide limited support for the first hypothesis, which predicts a positive effect of mergers on bank efficiency. While no significant improvements are observed for TE and PTE, the negative ATT for SE suggests that cross-border mergers may initially generate scale inefficiencies rather than immediate efficiency gains. These findings reinforce the argument that merger-related efficiency effects are dynamic and conditional, rather than automatic.

Table 6 confirms that the matched sample retains a sufficiently large number of observations, with an overall match rate of 81.56%, ensuring adequate statistical power for subsequent DiD estimation. By restricting the analysis to matched banks, the following DiD results can be interpreted as reflecting causal merger effects, rather than pre-existing differences between merged and non-merged institutions.

Table 6. Matched Sample Distribution

Group	Initial Observations	Matched Observations	Match Rate (%)
Merged Banks	160	101	63.13%
Non-Merged Banks	160	160	100%
Total	320	261	81.56%

4.3. Difference-in-Differences Analysis

To identify the causal impact of cross-border mergers on bank efficiency, this study employs a DiD approach using quarterly panel data from 2017 to 2024. By comparing efficiency changes before and after merger events between merged (treatment) and non-merged (control) banks, the DiD framework isolates merger effects while controlling for time-invariant bank heterogeneity and common macroeconomic shocks.

4.3.1. Average Merger Effects on Efficiency

Table 7 reports the DiD estimation results for TE, PTE, and SE. The merger dummy variable (DiD) exhibits negative coefficients for both TE and PTE, indicating that, on average, merged banks experienced a decline in operational and managerial efficiency in the post-merger period relative to comparable non-merged banks.

Although the magnitude varies across models, the direction of the effect is consistently negative.

Table 7 Difference-in-Differences Estimation Results for Bank Efficiency

Variable	TE	PTE	SE
DiD (Merger)	-2.3675	-1.9952	-0.5602
DiD × Bank Size	0.1259	0.1083	0.0274
Total Asset (TA)	0.0017	0.0056	-0.0006
CAR	0.0039	0.0034	0.0006
ROA	0.0401	0.0535	-0.0140
NIM	-0.0086	-0.0101	0.0012
LDR	0.0058	0.0052	0.0008
NPL	-0.0028	0.0012	-0.0043
Year 2018	-0.0311	-0.0326	0.0006
Year 2019	-0.0253	-0.0239	-0.0031
Year 2020	-0.0540	-0.0626	0.0065
Year 2021	-0.0436	-0.0557	0.0102
Year 2022	-0.0293	-0.0320	0.0009
Year 2023	-0.0246	-0.0318	0.0041
Year 2024	-0.0227	-0.0121	-0.0157

However, the interaction term (DiD × Bank Size) is positive and significant, suggesting that larger banks are better able to manage the complexity of post-merger integration and sustain efficiency gains. In other words, size moderates the negative merger effect, large merged banks can leverage economies of scope, technology, and capital resources to stabilize efficiency more quickly. This pattern supports the findings of Wheelock and Wilson (2012), who noted that efficiency losses from mergers tend to be temporary and mitigated in institutions with greater resources and managerial capacity.

The effects of other control variables indicate that ROA positively influences both TE and PTE, underscoring the role of profitability in enhancing managerial and operational efficiency. Meanwhile, NIM has a slightly negative coefficient, implying that a heavy reliance on interest income may reduce efficiency due to riskier lending practices or interest margin pressures. Year dummies for 2020 and 2021 show notable efficiency declines across models, reflecting the dual impact of merger integration and the COVID-19 pandemic. Interestingly, the merger variable has no significant effect on SE, suggesting that economies of scale from mergers are not automatically realized.

In relation to the proposed hypotheses, the DiD results provide clear evidence regarding the efficiency effects of cross-border mergers. The negative and statistically insignificant coefficients of the merger dummy (DiD) for TE and PTE indicate that the first hypothesis, predicting a positive impact of mergers and acquisitions on technical and managerial efficiency, is not supported. However, the positive and significant interaction term between the merger dummy and bank size (DiD × Bank Size) supports the second hypothesis, suggesting that larger banks are better positioned to absorb integration costs and mitigate post-merger efficiency losses. The absence of a significant merger effect on SE implies that the third hypothesis, which posits scale efficiency gains from mergers, is also not supported in the short run.

From a theoretical standpoint, these findings challenge the strong form of synergy theory, which predicts automatic efficiency improvements following mergers. Instead, the results support a conditional efficiency framework in which efficiency gains depend on post-merger integration capacity, institutional compatibility, and

bank-specific characteristics. This nuanced evidence highlights the importance of contextual and transitional dynamics in evaluating the efficiency consequences of cross-border bank mergers and acquisitions, particularly in emerging markets such as Indonesia.

4.4. Determinants of Efficiency (Tobit Regression)

To further explain variation in bank efficiency outcomes beyond merger effects, this study employs a Tobit regression on the matched sample. This model is appropriate because data envelopment analysis efficiency scores are censored in the [0,1] interval, rendering ordinary least squares estimators biased and inconsistent. Unlike the DiD analysis, which focuses on the causal impact of mergers, the Tobit model serves an explanatory role, identifying bank-specific financial characteristics that strengthen or weaken efficiency performance.

4.4.1. Size Effects and Diseconomies of Complexity

Table 8. Tobit Regression Estimates for Bank Efficiency

Variable	TE (Coef.)	TE (p)	PTE (Coef.)	PTE (p)	SE (Coef.)	SE (p)
TA	-0.0243	0.006**	-0.0475	0.000***	0.0157	0.000***
CAR	0.0002	0.864	0.0030	0.020**	-0.0028	0.000***
ROA	0.0321	0.002***	0.0276	0.014**	0.0069	0.020**
NIM	-0.0110	0.016**	-0.0146	0.003***	0.0022	0.092*
LDR	0.0045	0.000***	0.0051	0.000***	-0.0003	0.054*
NPL	-0.0182	0.000***	-0.0210	0.000***	0.0001	0.941

Note: ***p < 0.01, **p < 0.05, *p < 0.10

As reported in Table 8, bank size (total assets/TA) exhibits a negative relationship with TE and PTE, but a positive relationship with SE. This asymmetric effect suggests that while larger banks benefit from operating closer to optimal scale, they simultaneously face managerial and coordination challenges that erode technical and managerial efficiency. This finding supports the diseconomies of complexity hypothesis, which argues that increasing organizational size can reduce flexibility, weaken monitoring, and complicate decision-making processes (Chiaramonte et al., 2023). In the context of cross-border banking, these complexities may be amplified by differences in organizational culture, governance structures, and regulatory compliance. ROA demonstrates a strong positive and significant effect across all efficiency measures, reaffirming profitability as a key determinant of operational and managerial performance. Profitable banks are likely to have better resource allocation, stronger risk management, and greater investment in technology, all of which contribute to higher efficiency.

NIM negatively affects TE and PTE, implying that heavy reliance on interest-based income can reduce efficiency by increasing exposure to credit risk and funding cost volatility. Conversely, LDR exerts a positive and significant influence on both TE and PTE, suggesting that effective intermediation between deposits and loans improves resource utilization. NPL has a strong negative relationship with both TE and PTE, consistent with the adverse impact of deteriorating asset quality on overall efficiency. Higher non-performing loans reflect poor credit risk management, which directly hampers operational performance. The effect of CAR is mixed: it enhances PTE but reduces SE. This suggests that while higher capital buffers may foster prudent management and operational soundness, overly conservative lending behavior could constrain the achievement of optimal scale efficiency.

NIM negatively affects TE and PTE, implying that excessive reliance on interest income may reduce efficiency by encouraging riskier credit expansion. LDR positively influences TE and PTE, underscoring the importance of effective financial

intermediation, whereas NPL significantly reduces efficiency, consistent with the adverse effects of asset-quality deterioration. The mixed effect of CAR suggests that while higher capital buffers improve managerial prudence (higher PTE), they may constrain scale efficiency (lower SE) due to conservative lending practices.

The Tobit regression results provide strong empirical support for the fourth hypothesis, which posits that bank-specific financial characteristics significantly influence efficiency outcomes. Profitability, asset quality, intermediation intensity, capitalization, and size all play meaningful roles in shaping efficiency performance. Importantly, these results complement the DiD analysis by explaining why efficiency outcomes differ across banks, rather than attributing such differences solely to merger events. By incorporating both causal (DiD) and explanatory (Tobit) analyses, the empirical framework offers a more comprehensive understanding of post-merger efficiency dynamics, reinforcing the argument that efficiency gains from cross-border mergers and acquisitions are conditional on internal financial strength and managerial capacity.

4.5. Synthesis of Empirical Findings and Hypothesis Evaluation

Table 9 presents a consolidated evaluation of the empirical results for all hypotheses tested in this study. Rather than indicating uniform efficiency improvements following cross-border mergers and acquisitions, the findings demonstrate that efficiency outcomes are conditional and heterogeneous, depending on bank size and financial fundamentals. The empirical findings indicate that efficiency gains from cross-border mergers are not automatic, particularly in the short- to medium-term. Contrary to the predictions of synergy theory and economies-of-scale arguments, mergers did not generate immediate improvements in technical, managerial, or scale efficiency (first and third hypotheses). Instead, the DiD and ATT results suggest that post-merger integration costs, such as organizational restructuring and cultural alignment, initially outweigh potential synergy gains.

Table 9 Summary of Empirical Findings and Hypothesis Testing

Hypothesis	Statement	Empirical Result	Conclusion
Mergers and Acquisitions → Bank Efficiency	Cross-border mergers and acquisitions improve TE and PTE	DiD & ATT results are insignificant	Not Supported
Bank Size → Bank Efficiency	Bank size moderates post-merger efficiency	DiD × Bank size positive and significant	Supported
Capital Adequacy Ratio, Profitability, and Net Interest Margin → Bank Efficiency	Mergers and acquisitions improve scale efficiency	ATT and DiD for SE negative/insignificant	Not Supported
Non-Performing Loans and Loan-to-Deposit Ratio → Bank Efficiency	Financial characteristics affect efficiency	Tobit results significant	Supported

However, the significant moderating role of bank size (second hypothesis) provides important nuance to this conclusion. Larger banks appear better equipped to absorb integration costs and stabilize efficiency, consistent with efficiency theory, which posits that institutions with greater resources, managerial depth, and technological capacity can internalize merger-related disruptions more effectively. The Tobit regression

results (fourth hypothesis) further demonstrate that internal financial strength is a critical determinant of efficiency outcomes. ROA consistently enhances efficiency, while deterioration in asset quality (NPL) significantly undermines it. These findings reinforce financial intermediation theory, which emphasizes that efficient banks are characterized by sound risk management, effective intermediation, and sustainable income structures.

5. Conclusion

This study demonstrates that cross-border mergers and acquisitions (M&As) in emerging banking markets do not guarantee immediate efficiency improvements, thereby offering a crucial refinement to established banking and organizational theories. Academically, the core theoretical contribution of this study lies in challenging and re-bounding the traditional synergy and efficiency theories, which have historically been modeled on frictionless assets in developed economies. By integrating financial intermediation theory with these frameworks, the empirical findings prove that ownership transformation does not automatically trigger operational synergies. Instead, this study introduces a nuanced boundary condition: the immediate post-merger phase in emerging markets is heavily dominated by transitional friction, institutional misalignment, and structural harmonization costs that temporarily overwhelm theoretical synergy gains.

Furthermore, this study advances the literature by reconciling the long-standing mixed evidence through the lens of institutional capacity. By identifying bank size as a critical conditioning factor, the findings refine efficiency theory; they demonstrate that the realization of strategic synergies is not a binary outcome of ownership change, but is actively moderated by the scale and shock-absorption capacity of the target institution. Larger banks possess the structural resilience to manage post-merger complexity, whereas smaller institutions suffer from scale inefficiencies when trying to digest foreign governance frameworks. Ultimately, this framework shifts the theoretical paradigm from an assumption of automatic asset-productivity enhancement to a conditional model of efficiency transmission, in which asset quality (NPL), prudential strength (CAR), and organizational scale determine whether the promises of financial intermediation and synergy theories are fulfilled or derailed by post-merger integration shocks.

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