

Article

Market Power and Multidimensional Efficiency in Banking: Diversification, Stability, and Digital–Governance Dynamics

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Abstract

This study examines how banks navigate the dual strategic imperatives of securing market power and optimizing multidimensional operational efficiency—technical, scale, and allocative efficiency—within emerging and transitional banking systems. Focusing on business model diversification and financial stability, this study also accounts for the conditioning roles of governance quality, institutional complexity, credit risk, and digitalization. Using bank-level data from Association of Southeast Asian Nations (ASEAN) and Middle East and North Africa (MENA) countries, the analysis applies Partial Least Squares Structural Equation Modeling (PLS-SEM) and multi-group analysis to assess direct, mediating, and moderating relationships. The results indicate that diversification and financial stability significantly strengthen market power, while their effects on efficiency are largely negative across efficiency dimensions. Governance quality partially mediates the stability–market power relationship, whereas institutional complexity weakens this linkage. Digital transformation maturity and market digitalization condition the diversification–efficiency nexus, with effects varying across efficiency types and regions. Overall, the findings reveal a strategic trade-off between competitive positioning and operational efficiency, emphasizing the importance of governance structures and digital capabilities in shaping bank performance across heterogeneous institutional contexts.

Keywords: bank market power; multidimensional efficiency; business model diversification; financial stability; digitalization; governance quality; ASEAN; MENA



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1. Introduction

In the aftermath of the 2008 Global Financial Crisis (GFC), the banking sector has operated within a prolonged low-interest-rate environment driven by accommodative monetary policies (Claessens et al., 2018; Lopez et al., 2020). This macroeconomic shift has compressed net interest margins, weakening the traditional profitability of lending based activities (Gehrig, 2015; Savona, 2022). As a result, banks have been pressured to reconfigure their business models by reducing reliance on interest income and expanding non interest income (NNIN) sources to remain competitive (Alzoubi, 2025; Nisar et al., 2018). At the same time, post crisis regulatory reforms such as Basel II and Basel III introduced stricter capital requirements aimed at absorbing economic shocks. These reforms have also unintentionally encouraged banks to shift toward fee based activities to optimize capital usage (Aderogba et al., 2025; Alnabulsi et al., 2023; Birindelli et al., 2022).

Despite its strategic appeal, the transition toward diversified business models presents a persistent theoretical and empirical paradox. From a resource-based view (RBV) perspective, bank performance depends on how efficiently resources such as human capital, cash assets, and technology are transformed into productive outputs (Akinyemi, 2025; Arbelo et al., 2020). However, extensive empirical evidence documents a diversification discount, particularly when potential gains are offset by exposure to volatile non interest activities (Doan et al., 2018; Guerry & Wallmeier, 2017; Kim et al., 2022). Early studies show that greater engagement in non interest income often increases income volatility without delivering proportional performance improvements (Stiroh, 2004; Stiroh & Rumble, 2006). Evidence from emerging markets reinforces this ambiguity, as revenue diversification in ASEAN banking systems does not necessarily improve financial stability (Lestari et al., 2023).

In parallel, the relationship between financial stability and market power remains contested. Market power is widely recognized as a key determinant of competitive strength (Fukuyama & Tan, 2022). However, the quiet life hypothesis suggests that excessive stability or dominance may weaken managerial incentives to maintain operational discipline (Ikeda et al., 2018; Le et al., 2024). This concern is particularly relevant given that many studies rely on narrow efficiency measures, such as cost efficiency (P. H. Nguyen & Pham, 2020) or technical efficiency linked to default risk (Curi et al., 2015; Maghyereh & Awartani, 2014). Such approaches may overlook broader performance trade-offs faced by banks.

The strategic environment is further complicated by rising institutional complexity and information asymmetry, especially in settings with weaker governance structures (Chen et al., 2025; Leonard et al., 2013). As banks expand their product portfolios and geographic reach, they develop increasingly complex organizational structures that obscure risk exposure and elevate coordination costs (Buch & Goldberg, 2022; Pham & Doan, 2023). These complexities generate governance challenges and increase compliance burdens, reducing organizational flexibility and limiting banks' ability to translate strategic initiatives into gains in market power and efficiency (Krause et al., 2017; Olarewaju, 2018; Palermo et al., 2017).

In response to these constraints, banks are undergoing a rapid digital transformation. Digitalization offers a mechanism to mitigate the diversification efficiency trade-off by reducing operational costs and improving service delivery (Beccalli, 2007; Manta et al., 2024). At the same time, competition from financial technology (FinTech) and big technology (BigTech) firms poses significant challenges for traditional banks, particularly those constrained by legacy systems (Karim & Lucey, 2024; Vives, 2019). While digital technologies can strengthen efficiency and competitive positioning (Y. Li et al., 2025; Shanti et al., 2024), they also involve high investment costs and heightened data security risks, making their net performance effects uncertain (Bueno et al., 2024; Varma et al., 2022).

A critical research gap emerges from this literature. Most existing studies examine bank performance through isolated efficiency dimensions, such as cost efficiency (P. H. Nguyen & Pham, 2020), profit efficiency (Arbelo et al., 2020), or technical efficiency (Curi et al., 2015). This fragmented approach fails to capture the complex trade-offs inherent in modern banking. A bank may perform well in technical efficiency while suffering from allocative inefficiency due to suboptimal capital allocation or scale inefficiency driven by excessive diversification. Moreover, limited attention has been given to the joint roles of internal digital transformation maturity and external market digitalization as conditioning factors within a multidimensional efficiency framework.

The primary objective of this study is to assess how banks navigate the dual strategic challenge of securing market power while optimizing multidimensional operational efficiency, comprising technical, scale, and allocative efficiency, within emerging and transi-

tional economies. The analysis focuses on two distinct regions: Association of Southeast Asian Nations (ASEAN) banking systems, characterized by rapid fintech adoption and expanding digital infrastructure (Khan et al., 2021), and the Middle East and North Africa (MENA) sector, where banking environments are shaped by commodity price volatility, geopolitical risks, and stability oriented regulatory priorities (Aliyu et al., 2023; Alzoubi, 2025; Mateev et al., 2023). By applying Partial Least Squares Structural Equation Modeling and multi group analysis, this study identifies systematic cross regional differences in how banks balance diversification, stability, and digital transformation under heterogeneous institutional conditions.

This study contributes to the banking and corporate finance literature in three ways. First, it incorporates institutional complexity as a structural constraint that may weaken the translation of financial stability into market power, extending the stability competition debate. Second, it advances the digital banking literature by disentangling the dual role of digitalization, examining digital transformation maturity as an internal mediating mechanism and market digitalization level as an external moderating condition. Third, the cross regional evidence from ASEAN and MENA offers new insights into how differences in regulatory frameworks and digital readiness shape the strategic nexus between diversification, stability, and bank performance.

2. Literature Review, Theoretical Framework, and Hypothesis

2.1. Business Model Diversification, Financial Stability, and Bank Market Power

Bank market power is a central concept in banking research, particularly under conditions of increasing competition and structural change. It reflects a bank's ability to price above marginal cost and is commonly measured using the Lerner Index (Gischer et al., 2015; Srivastava et al., 2022). Beyond competitive positioning, market power captures a bank's capacity to preserve franchise value and sustain long-term profitability.

Business model diversification represents a strategic channel through which banks can strengthen their market power. Diversification involves engaging in multiple products and services to broaden revenue sources beyond traditional lending (Z. Li & Kim, 2024). From a business model perspective, diversification reflects how banks create and capture value in competitive markets (Ritter & Pedersen, 2020).

In practice, diversification in banking is often operationalized through the expansion of non-interest income, including fees, commissions, and trading activities (J. Nguyen, 2012). This strategic shift is widely viewed as a response to declining net interest margins and intensified competition in loan markets (Lee et al., 2014; Nisar et al., 2018). By moving into non-traditional activities, banks reduce their dependence on interest income. This allows them to capitalize on market segments with lower competitive pressure (Das & Pati, 2025).

Empirical evidence supports a positive association between diversification and bank market power. Cross-country studies show that banks with higher non-interest income shares tend to exhibit stronger pricing power and more resilient business models (Das & Pati, 2025; Setianto et al., 2025). Similar findings are reported in emerging markets, including South Asia, Vietnam, and the MENA region, where diversification enhances profitability and competitive positioning (Nisar et al., 2018; Oanh et al., 2024).

However, the benefits of diversification are not uniform across banks. Prior studies show that its effectiveness depends on bank size, capitalization, and institutional conditions, often exhibiting non-linear effects (Lin et al., 2021; Tabak et al., 2011). Moreover, the relationship between diversification and market power may be bidirectional. While diversification can strengthen market power, banks that already possess significant market power may be better positioned to pursue new diversification strategies (M. Nguyen et al., 2016).

Financial stability constitutes another key determinant of bank market power. Stability is commonly measured by the Z-score, which combines profitability, capitalization, and earnings volatility to calculate the distance to insolvency (Karadima & Louri, 2020). Higher stability enhances franchise value and allows banks to sustain pricing power over time (Herwald et al., 2024; Repullo, 2004).

Empirical studies consistently report a positive link between stability and market power. Stable, well-capitalized banks are better equipped to maintain high margins and withstand competitive pressure, particularly in emerging economies (Kasman & Carvalho, 2014; Soedarmono et al., 2011; Wu et al., 2019). Evidence from the ASEAN and Asia-Pacific regions further suggests that financial stability strengthens banks' bargaining position and long-term strategic capacity (Minh et al., 2020; Qori'ah et al., 2025).

Overall, the literature suggests that diversification and financial stability play complementary roles. While diversification expands revenue opportunities, stability protects franchise value and pricing capacity. Nevertheless, these relationships remain context-dependent and are shaped by institutional and competitive conditions, particularly in emerging banking systems.

2.2. Diversification, Stability, and Multidimensional Bank Efficiency

Bank efficiency is fundamentally a measure of managerial quality, reflecting how effectively banks transform inputs into outputs, operate at optimal scale, and allocate resources given prevailing prices. Within this framework, business model diversification, particularly expanding non-interest income, is often discussed as a strategic mechanism to enhance efficiency. Banks can exploit economies of scope and improve resource utilization through these non-traditional activities (Landi & Venturelli, 2005; Lown et al., 2000).

A substantial body of empirical evidence supports the view that income diversification can enhance bank efficiency. Diversified banks benefit from imperfect correlations between interest-based and non-interest-based activities, which allow them to smooth income streams, generate informational advantages, and improve the risk–return trade-off (Doan et al., 2018). Cross-country evidence suggests that diversification is positively associated with cost and profit efficiency, particularly in developing and emerging banking systems, where the benefits of diversification tend to be more pronounced (Chronopoulos et al., 2011). Similar findings are reported for banks in Asia and Africa, where higher reliance on non-interest income improves technical efficiency and facilitates better utilization of inputs (Alhassan & Tetteh, 2017; Berger et al., 2010).

However, the diversification–efficiency relationship is neither uniform nor linear. Diminishing or adverse efficiency effects may occur when diversification exceeds optimal levels or when banks enter unfamiliar, highly competitive sectors. Excessive diversification may intensify agency problems, increase monitoring costs, and dilute managerial focus. These factors can erode both technical and allocative efficiency (DeYoung & Roland, 2001; T. L. A. Nguyen, 2018). Empirical evidence from Vietnam, Luxembourg, and Ghana further suggests that certain forms of diversification, particularly funding diversification, are consistently associated with lower technical efficiency, challenging the conventional wisdom that diversification is universally beneficial (Alhassan, 2015; Curi et al., 2015).

These mixed findings underscore the importance of efficiency heterogeneity across dimensions. Diversification may improve scale efficiency by spreading fixed costs over more activities, but its effect on technical and allocative efficiency depends on managerial capability and institutional context (Ayadi et al., 2023; Vidyarthi, 2019). In this sense, diversification enhances efficiency primarily when it aligns with banks' core competencies and operates within an optimal range.

Beyond business model choices, financial stability plays a critical role in shaping efficiency outcomes. Stable banks, characterized by higher Z-scores and strong capital positions, are better positioned to allocate resources efficiently and absorb shocks (Barra & Zotti, 2019; Maghyereh & Awartani, 2014). Empirical evidence consistently shows that banks with lower default risk tend to exhibit higher cost and technical efficiency, as reduced risk-taking lowers monitoring costs and improves managerial focus (Akins et al., 2016; Fiordelisi et al., 2011).

Nevertheless, the stability–efficiency nexus is also nuanced. While stability supports efficiency through a predictable environment, excessive capital or liquidity buffers may reduce cost efficiency by limiting leverage advantages (Miah & Uddin, 2017; Sakouvogui & Shaik, 2020). Moreover, some studies argue that efficiency improvements can precede stability rather than result from it, suggesting potential bidirectional causality between the two constructs (Hafez, 2022; D. T. Nguyen et al., 2024). These findings highlight that stability does not automatically translate into efficiency unless supported by sound managerial practices and competitive discipline.

Overall, the literature suggests that diversification and stability are central, yet conditional, determinants of efficiency. Diversification can enhance efficiency via economies of scope, while stability reduces risk-related distortions. However, the direction of these effects depends on the form of diversification and the institutional environment. Accordingly, this study examines bank efficiency as a multidimensional construct encompassing technical, scale, and allocative efficiency.

2.3. Governance as a Strategic Transmission Mechanism

Corporate governance plays a pivotal role in linking bank-level resources to strategic and market outcomes. In the banking sector, governance extends beyond the traditional principal–agent relationship between shareholders and managers. Given the unique contractual structure and systemic importance of banks, governance frameworks must also account for depositors, creditors, and supervisory authorities (Mayes et al., 2001; Muranda, 2006). Consequently, governance functions as an institutional mechanism through which financial stability is monitored, disciplined, and strategically deployed.

A growing body of literature emphasizes that financial stability alone is insufficient to ensure sound performance or competitive strength. Instead, stability provides the foundational conditions that allow for governance mechanisms to operate effectively. Stable banks possess greater slack resources. This enables them to invest in costly governance infrastructures, such as internal audits, risk management systems, transparency mechanisms, and board oversight (K. Li et al., 2020; Susanto & Walyoto, 2022). In the absence of such structures, financial stability may be exploited by managers to pursue private benefits or take on excessive risk, thereby intensifying agency problems.

Empirical evidence consistently shows that weak governance undermines stability and increases the risk of failure. Global Financial Crisis studies demonstrate that ownership and compensation structures significantly shape managerial risk-taking incentives. Specifically, high shareholdings among non-CEO managers are associated with greater failure risk due to moral hazard (Berger et al., 2016). Similar patterns appear in emerging economies. In these regions, governance failures and weak regulatory oversight frequently precede financial distress and institutional collapse (Muranda, 2006).

Conversely, strong governance frameworks enhance banks' capacity to translate financial stability into sustainable performance. Effective governance constrains opportunistic behavior, improves asset allocation, and strengthens internal discipline (Rahim & Aisyah, 2025; Riahi, 2020). Evidence from both conventional and Islamic banking systems further suggests that governance design, particularly board structure, plays a critical role in shap-

ing stability outcomes, although the effectiveness of specific mechanisms varies across institutional contexts (Mamatzakakis et al., 2023).

Beyond stability, governance also influences strategic positioning and market outcomes. Well-functioning governance structures enhance operational efficiency and stakeholder confidence. These factors are especially vital in concentrated markets where external discipline is limited (Bhatia, 2024; Uddin & Ahmed, 2018; Wahyudin & Solikhah, 2017). However, when governance is weak, market power and ownership concentration may instead intensify risky behavior (Yeddou, 2024). Overall, the literature converges on the view that corporate governance acts as a strategic transmission mechanism through which financial stability is converted into sustainable bank market power.

2.4. The Boundaries of Market Power: Credit Risk and Institutional Complexity

Market power allows for banks to influence pricing, expand credit, and secure competitive rents. However, its strategic effectiveness is constrained by risk conditions and organizational structure. Credit risk and institutional complexity determine whether financial stability can be transformed into sustained market dominance or if it instead becomes a source of fragility.

Credit risk, commonly proxied by non-performing loans (NPLs), represents a direct limitation on banks' strategic capacity. Rising NPLs reflect deteriorating loan quality and weaknesses in monitoring, which erode profitability through higher provisioning needs and capital pressures (Laryea et al., 2016). Empirical evidence consistently shows that elevated NPLs reduce returns and weaken financial performance, as losses from impaired loans outweigh any risk-related gains (Bhattarai, 2020; Laryea et al., 2016). As a result, resources that could otherwise support market expansion are diverted toward loss absorption and repairing the balance sheet.

Beyond their impact on performance, high NPL levels alter banks' competitive behavior. Credit risk discourages aggressive lending and induces more conservative policies, especially after financial stress (Cucinelli, 2015). This contraction in credit supply limits a bank's ability to grow its market share through loans. Furthermore, problem loans increase monitoring costs and distract managers from strategic positioning, thereby reducing organizational flexibility (Berger & DeYoung, 1997). In such environments, financial stability becomes defensive rather than a platform for market dominance.

The presence of threshold effects further complicates this interaction. While moderate market power may encourage prudent behavior by protecting franchise value, excessive credit risk can undermine this discipline. Large stocks of NPLs constrain lending capacity and capital accumulation, weakening the link between stability and competitive strength (Karadima & Louri, 2020; Louhichi et al., 2019). Evidence from emerging and developing banking systems confirms that high NPL environments are associated with greater instability and reduced strategic leverage, even among well-capitalized banks (Kulu & Osei, 2023; Sain & Kashiramka, 2023).

Institutional complexity is a second boundary condition in the stability–market power relationship. As banks expand across activities and regions, complexity increases, generating both diversification benefits and governance challenges (Cetorelli & Goldberg, 2014). While complexity may enhance risk sharing and insulation from localized shocks, it also raises agency costs, monitoring difficulties, and supervisory burdens (Krause et al., 2017; Laeven et al., 2016).

Empirical findings suggest that complexity's effects are heterogeneous. Organizational complexity is often associated with higher risk due to coordination failures, whereas geographic complexity may provide diversification gains under effective oversight (Anani, 2024; Argimón & Rodríguez-Moreno, 2022). However, when governance and supervisory

capacity fail to keep pace with structural expansion, complexity absorbs managerial resources and impedes efficient capital deployment, diluting the strategic value of financial stability (Buch & Goldberg, 2022; Pham & Doan, 2023).

Overall, the literature suggests that stability does not automatically translate into market power. Credit risk can drain capital and restrict lending, while excessive complexity can weaken strategic coherence through coordination costs. Together, these factors define the boundaries within which stable banks can effectively convert balance sheet strength into competitive dominance.

2.5. Digital Transformation Maturity as an Internal Strategic Bridge

Digital transformation maturity is a critical internal mechanism that helps banks convert strategic initiatives into efficiency gains. In banking, this represents the deep integration of digital technologies into core processes and organizational routines, rather than mere technology adoption (Mavlutova et al., 2023). As such, it functions as a strategic bridge linking complex business strategies, particularly business model diversification, to improvements in bank efficiency across multiple dimensions.

Prior studies indicate that diversification strategies can stimulate digital transformation by increasing operational complexity and the need for advanced information-processing capabilities. Z. Li and Kim (2024) show that product and geographical diversification significantly enhance digital transformation by broadening access to heterogeneous knowledge, technologies, and resources. In banking, diversifying into multiple products amplifies coordination demands and data intensity. Consistent with this view, Stulz (2019) argues that competitive pressure from FinTech and BigTech firms compels banks to adopt digital technologies to support cross-selling, exploit economies of scope, and maintain informational advantages.

The effectiveness of digital transformation depends on the composition and strategic orientation of information technology (IT) investment, not just its scale. Beccalli (2007) demonstrates that aggregate IT spending does not automatically improve bank efficiency, highlighting a “profitability paradox”. Crucially, investments in IT services, such as consulting, training, and support, enhance profit efficiency. In contrast, excessive reliance on hardware and software alone may weaken performance. This evidence supports using IT investment intensity relative to operating costs as a proxy for digital transformation maturity, as it captures the ability to translate technological inputs into productive outcomes.

A growing body of empirical literature confirms that digital transformation maturity enhances bank efficiency, although the effects are often dynamic and heterogeneous. Digital initiatives tend to improve efficiency over time, despite initial adjustment costs and time lags (Kriebel & Debener, 2019; Shanti et al., 2024). Cross-country evidence further shows that digitalization and FinTech adoption contribute to efficiency improvements through cost reduction, process automation, and better resource allocation (Goel & Kashiramka, 2025; Y. Li et al., 2025; Liu et al., 2024; Zuo et al., 2021). By enabling banks to manage complexity and optimize economies of scale, digital maturity provides a key internal channel to improve technical, scale, and allocative efficiency.

2.6. Market Digitalization as an External Contingency Factor

Market digitalization reflects the extent to which an economy is supported by digital infrastructure, the diffusion of information and communication technology (ICT), digital skills, and the widespread adoption of digital services. As an external environmental condition, market digitalization shapes how effectively banks can deploy internal strategies and convert them into efficiency gains. Prior studies emphasize that digitalized markets facilitate faster information transmission, lower transaction costs, and improved coordination

across economic actors, thereby altering firms' operational environments and productivity outcomes (Cheng et al., 2021). In banking, these external digital conditions are particularly relevant given the sector's reliance on information processing, customer connectivity, and scale economies.

Empirical evidence suggests that ICT diffusion conditions the efficiency of financial activities. Cheng et al. (2021) show that while financial development can sometimes have adverse effects, ICT diffusion mitigates them through positive interaction. Mobile connectivity, in particular, enhances information dissemination. In contrast, internet-based infrastructure yields more ambiguous outcomes in less developed markets. This suggests that market-level digitalization moderates how banks leverage scale and allocative mechanisms rather than providing uniform benefits.

Recent banking-specific studies confirm that digitalization benefits depend on market readiness and institutional alignment. Vuong et al. (2025) find that ICT investment improves bank efficiency in Vietnam, but its effectiveness depends on strategic fit and regulatory support. Similarly, country-level digital skills strengthen a bank's ability to translate transformation into performance (Citterio et al., 2024). Banks in digitally mature markets face fewer obstacles when deploying diversified products or coordinating multi-channel operations.

Cross-country evidence from emerging and developing economies reinforces the contingent role of market digitalization. Studies covering Africa, ASEAN, and Central and Eastern Europe highlight that ICT diffusion enhances financial depth, access, and operational efficiency when complemented by regulatory quality and digital infrastructure (Manta et al., 2024; D. T. N. Nguyen, 2025; Raifu et al., 2024). However, some works document nonlinear effects. Diminishing returns can occur if digital adoption outpaces institutional capacity or user readiness (Fuseini, 2025; Fuseini et al., 2024). These patterns underscore that market digitalization acts as a conditioning factor rather than an automatic driver of efficiency.

Overall, the literature indicates that market digitalization provides the external context for diversification strategies. In highly digitalized markets with robust infrastructure and supportive governance, banks can distribute products more efficiently. They can reduce coordination costs and better leverage economies of scale. Conversely, in less digitalized environments, diversification may intensify inefficiencies due to higher transaction costs. Thus, market digitalization shapes the strength of the diversification–efficiency relationship across technical, scale, and allocative dimensions.

2.7. Theoretical Framework and Hypotheses

This study adopts an integrated theoretical framework combining the structure–conduct–performance (SCP) paradigm, the resource-based view (RBV), and agency theory. This is complemented by the quiet life hypothesis and the diversification discount perspective. Such a multi-theoretical approach is essential to explain how banks simultaneously pursue market dominance and operational efficiency, especially within emerging and transitional systems.

The SCP paradigm underpins the analysis of bank market power, measured by the Lerner Index. Rooted in Bain (1951) and adapted to banking by Berger (1995), SCP posits that market structure shapes banks' pricing behavior and performance. In concentrated markets, banks with greater financial stability and diversified business models are better positioned to absorb regulatory constraints and exercise pricing power without substantial market share losses (Fukuyama & Tan, 2022). Empirical evidence confirms that market concentration and bank-specific advantages can reinforce market power, even if this dominance does not reflect superior efficiency (Chortareas et al., 2011; Ghaemi Asl et al., 2021).

To explain efficiency heterogeneity, the framework incorporates the RBV. RBV argues that competitive advantage arises from internal resources that are valuable, rare, and difficult to imitate (Barney, 1991; Wernerfelt, 1984). In this context, financial stability is conceptualized as strategic financial slack that enables banks to withstand shocks and support diversification. Meanwhile, digital transformation maturity represents a critical intangible capability that allows banks to integrate these diversified activities to achieve efficiency gains. These resources are vital for banks undergoing technological transitions.

However, diversification and stability may also intensify organizational complexity and agency problems. Drawing on agency theory (Jensen & Meckling, 1976), the framework acknowledges that complex structures exacerbate information asymmetry between shareholders and managers. This can lead to the misallocation of risk. Therefore, corporate governance quality serves as a key monitoring mechanism that disciplines managers. It ensures that stability translates into sustainable market power rather than managerial slack.

Finally, the quiet life hypothesis (Berger & Hannan, 1998) and the diversification discount argument (Laeven & Levine, 2007) provide important countervailing insights. These perspectives suggest that banks with excessive dominance or diversification may face reduced competitive pressure and higher agency costs. This can lead to declining technical or allocative efficiency. This highlights the need for mediating mechanisms like digital transformation maturity and external conditions like market digitalization to prevent market dominance from eroding operational performance.

In addition to the main explanatory variables, this study controls for leverage, bank size, and risk management quality (RMQ), which are widely recognized as fundamental determinants of bank performance and efficiency. Leverage captures capital structure effects and risk-bearing capacity, while bank size reflects scale-related advantages and complexity. Meanwhile, RMQ accounts for differences in banks' ability to manage credit and operational risks. These controls ensure that the estimated relationships are not confounded by fundamental balance sheet and risk management characteristics.

Based on this integrated framework, the conceptual model illustrated in Figure 1 depicts the assumed direct and moderated relationships among the key constructs, and the following hypotheses are formulated:

- H1.** *Business model diversification has a positive effect on bank market power.*
- H2.** *Financial stability has a positive effect on bank market power.*
- H3.** *Business model diversification has a positive effect on bank (a) technical, (b) scale, and (c) allocative efficiency.*
- H4.** *Financial stability has a positive effect on bank (a) technical, (b) scale, and (c) allocative efficiency.*
- H5.** *Corporate governance quality mediates the relationship between financial stability and bank market power.*
- H6.** *Non-performing loans (NPL) moderate the relationship between financial stability and bank market power.*
- H7.** *Institutional complexity moderates the relationship between financial stability and bank market power.*
- H8.** *Digital transformation maturity mediates the relationship between business model diversification and bank (a) technical, (b) scale, and (c) allocative efficiency.*

H9. Market digitalization moderates the relationship between business model diversification and bank (a) technical, (b) scale, and (c) allocative efficiency.

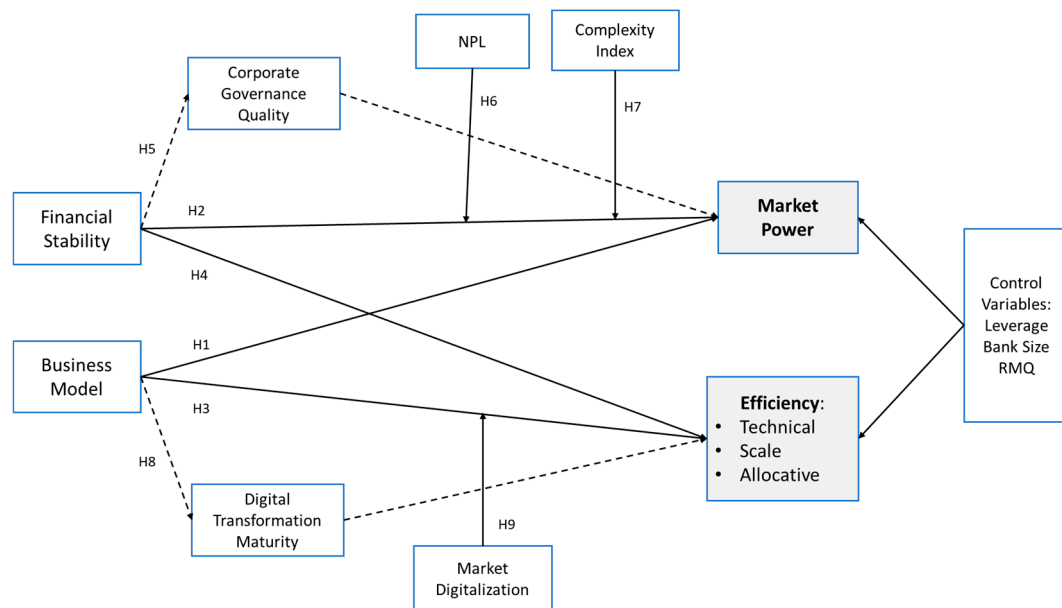


Figure 1. Conceptual Framework Showing Direct, Mediated, and Moderated Relationships. Solid arrows represent direct effects, moderation, and control paths, while dashed arrows indicate mediation hypotheses. NPL: non-performing loans; RMQ: risk management quality.

3. Materials and Methods

This study utilizes secondary data from conventional commercial banks operating in ASEAN and MENA countries over the period 2010–2019. The initial sample includes all conventional commercial banks with continuous financial and governance disclosures available in Bloomberg L.P. (New York, NY, USA) during the observation period. To ensure consistency and replicability, banks with incomplete data on key variables were excluded. The final sample consists of the ten largest banks by total assets in each country. The list of countries and specific sample sizes are detailed in Table A1 in the Appendix A.

Financial, governance, and risk-related bank-level data are primarily obtained from Bloomberg due to its standardized reporting framework and extensive coverage of cross-country banking institutions. Where necessary, Bloomberg L.P. (New York, NY, USA) data are cross-validated and complemented with publicly available information from banks' annual reports and official stock exchange disclosures. Supplementary country-level indicators related to digital infrastructure, financial inclusion, and digital development are sourced from the World Bank (Washington, DC, USA) Digital Development database, the International Telecommunication Union (ITU, Geneva, Switzerland) ICT statistics, and the World Bank (Washington, DC, USA) Global Findex Database. All country-level indicators are harmonized at the country–year level and normalized to ensure cross-country comparability.

The observation period is deliberately chosen to exclude both the Global Financial Crisis and the COVID-19 pandemic, thereby capturing banking behavior under relatively stable regulatory and macroeconomic conditions. Focusing on large banks is consistent with prior literature emphasizing their dominant role in market competition, financial stability transmission, and digital adoption dynamics, particularly in emerging and transitional banking systems.

The conceptual framework illustrating the direct, mediating, and moderating relationships examined in this study is presented in Figure 1 (Conceptual framework showing

direct and moderated relationships). The framework explicitly models two distinct but interrelated performance outcomes, market power and multidimensional efficiency, allowing the analysis to capture potential trade-offs and complementarities between competitive dominance and operational performance. A detailed summary of variable measurements is reported in Table 1.

Table 1. Summary of variable measurement.

Variable	Symbol	Proxy/Measurement Formula
Business model	NNIN	Non-Interest Income/Operating Income.
Bank stability	Z-Score	$ROA_{it} + (EQ/TA)_{it} / \sigma(ROA_{it})$
Market power	LI	Lerner Index: $P_{st} - MC_{st} / P_{st}$
Technical efficiency	TE	DEA Score (VRS Model). Input-oriented.
Allocative efficiency	AE	DEA Score reflecting optimal input mix at given prices.
Scale efficiency	SE	Ratio of DEA CRS to DEA VRS
Digital transformation	DTM	Composite index of infrastructure, operations, payments, IT intensity
Corporate governance quality	CGQ	Composite index of board, ownership, disclosure, incentives
Market digitalization	MDL	Composite index of national digital infrastructure, financial inclusion, regulatory readiness, and policy support
Complexity index	CI	Composite index of asset complexity, geographic complexity, and organizational complexity
Non-performing loan	NPL	Non-Performing Loans/Total Gross Loans
Bank size	Size	Natural Logarithm of Total Assets
Leverage	Leverage	Total Debt/Total Equity
Risk management quality	RMQ	Weighted Score (0–100): Monitoring, Assessment, Compliance, Controls, Audit

Business model diversification is proxied by non-interest income (NNIN), which reflects banks' reliance on non-traditional activities beyond interest-based intermediation. Consistent with the diversification literature, NNIN is measured as the ratio of non-interest operating income to total operating income, expressed as:

$$NNIN_{it} = \frac{\text{Non Interest Operating Income}_{it}}{\text{Operating Income}_{it}} \quad (1)$$

where $NNIN_{it}$ represents the aggregate share of non-interest income for bank i in year t . Non-interest income includes fees and commissions, trading and derivatives income, and other operating revenues. Operating income, on the other hand, comprises net interest income and non-interest income. This measure builds upon prior studies that utilize income structure to capture banks' strategic diversification choices (Aliyu et al., 2023).

Bank financial stability is measured using the Z-score, a widely adopted indicator of bank risk and distance-to-default in the banking and finance literature (Banna & Alam, 2021). The Z-score explicitly compares profitability and capitalization buffers against earnings volatility and is defined as:

$$Z_{it} = \frac{ROA_{it} + (EQ/TA)_{it}}{\sigma(ROA_{it})} \quad (2)$$

where ROA_{it} denotes return on assets, $(EQ/TA)_{it}$ represents the equity-to-total-assets ratio, and $\sigma(ROA_{it})$ is the standard deviation of ROA. Higher Z-score values indicate greater financial stability and lower risk of insolvency. Following recent empirical studies, the logarithm of the Z-score is employed to mitigate skewness in the distribution (Banna & Alam,

2021; Lestari et al., 2023), while risk-adjusted ROA and ROE are used as complementary stability measures.

Bank efficiency is estimated using Data Envelopment Analysis (DEA), a non-parametric frontier technique originally developed by Charnes et al. (1978) and widely applied in banking efficiency studies (Alhassan & Tetteh, 2017; Vidyarthi, 2019). DEA measures relative efficiency by maximizing the ratio of weighted outputs to weighted inputs, expressed as:

$$h_s = \frac{\sum_{i=1}^m u_i y_{is}}{\sum_{j=1}^n v_j x_{js}} \quad (3)$$

where h_s is the efficiency score of bank s , y_{is} and x_{js} denote output and input quantities, and u_i and v_j are the corresponding weights. Efficiency scores range between 0 and 1. This study applies both Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) assumptions to derive technical efficiency, allocative efficiency, and scale efficiency. The VRS specification is used to capture both pure technical and allocative efficiency, reflecting the assumption that banks may not operate at optimal scale. In contrast, scale efficiency is computed as the ratio of CRS to VRS scores (Chortareas et al., 2011; Liu et al., 2024).

Market power is proxied by the Lerner Index, a non-structural measure of pricing power widely used in banking competition studies (Lin et al., 2021; Tan & Anchor, 2017). The Lerner Index is calculated as:

$$Lerner_{st} = \frac{P_{st} - MC_{st}}{P_{st}} \quad (4)$$

where P_{st} represents the ratio of total revenue to total assets for bank s at time t , and MC_{st} denotes marginal cost. Marginal cost is estimated from a translog cost function using Stochastic Frontier Analysis (SFA), as described in Berger et al. (2017). Higher Lerner values indicate greater market power and weaker competitive pressure, consistent with evidence from both developed and emerging banking systems (Das & Pati, 2025; T. T. H. Nguyen et al., 2022; Pak & Nurmakhanova, 2013).

Digital Transformation Maturity (DTM) is constructed as a composite index capturing banks' digital capabilities and technology deployment. Following recent digital banking studies, DTM is defined as:

$$DTM = 0.25(DI) + 0.25(OO) + 0.25(PI) + 0.25(ITI) \quad (5)$$

where DI represents digital infrastructure, OO online operations, PI payment innovation, and ITI IT investment intensity, each component is normalized to a 0–1 scale using publicly disclosed information. Each component is measured annually at the bank level using publicly disclosed information and normalized to a 0–1 scale to ensure cross-bank and cross-country comparability. This approach is consistent with prior efforts to operationalize digital transformation in the presence of data constraints (Banna & Alam, 2021; Citterio et al., 2024).

Digital infrastructure is measured using indicators of mobile and internet banking coverage, API availability, and disclosed information on data system quality obtained from Bloomberg financial analysis, annual reports, and regulatory filings. Online operations capture the degree of digital service delivery, measured by the share of transactions and customers using digital channels and the presence of automated lending systems. Payment innovation reflects the adoption of real-time payment systems, digital wallet integration, and emerging payment technologies, based on fintech databases and public disclosures. IT investment intensity is calculated as IT expenditure relative to total operating costs using annual report expense breakdowns.

Corporate Governance Quality (CGQ) is measured using a weighted composite index reflecting board effectiveness, ownership structure, disclosure quality, and executive alignment, expressed as:

$$CGQ = 0.35(BI) + 0.30(OA) + 0.20(DQ) + 0.15(EA) \quad (6)$$

where *BI* denotes board independence, *OA* ownership adjustment, *DQ* disclosure quality, and *EA* executive alignment. All governance components are derived from observable disclosures and normalized to a 0–1 scale. The index design draws on governance dimensions commonly used in banking governance research (Bhatia, 2024; Dedu & Chitan, 2013; Muranda, 2006). Board independence is measured by the proportion of independent directors using predefined thresholds. Ownership adjustment is calculated as the inverse of the Herfindahl index to capture ownership concentration. Disclosure quality is assessed based on compliance with core International Corporate Governance Network (ICGN) governance principles using annual and sustainability reports. Executive alignment reflects the share of performance-based compensation in total executive remuneration.

Market Digitalization (MDL) captures the digital financial ecosystem at the country level and is measured as:

$$MDL = 0.25(DI) + 0.25(FI) + 0.25(RR) + 0.25(PS) \quad (7)$$

where *DI* represents national digital infrastructure, *FI* financial inclusion, *RR* regulatory readiness, and *PS* policy support, this construction aligns with ICT-based and digital inclusion indices used in cross-country studies (Cheng et al., 2021; Khera et al., 2022; Vuong et al., 2025). All components are measured at the country–year level and normalized to a 0–1 scale. Digital infrastructure is proxied by internet coverage, mobile penetration, and data security indicators. Financial inclusion reflects account ownership and fintech adoption rates. Regulatory readiness captures the development of digital finance regulations and sandbox initiatives. Policy support reflects national digital finance strategies and cybersecurity frameworks, based on official government and international databases.

Organizational complexity is measured using a composite Complexity Index (CI) that integrates asset, geographic, and organizational dimensions, defined as:

$$Complexity_{it} = 0.40(AC) + 0.30(GC) + 0.30(OC) \quad (8)$$

where *AC* denotes asset complexity, *GC* geographic complexity, and *OC* organizational complexity, this approach is consistent with the multidimensional view of banking complexity proposed by Cetorelli and Goldberg (2014) and extended by Carmassi and Herring (2016) and Krause et al. (2017). Each component is normalized to a 0–1 scale. Asset complexity is proxied by bank size quartiles and adjusted for loan portfolio diversification. Geographic complexity reflects the number of countries in which a bank operates. Organizational complexity captures the internal structural arrangement of banks, distinguishing between simple, standard, and holding-company structures.

Credit risk is proxied by the non-performing loan (NPL) ratio, which is measured as the ratio of non-performing loans to total loans. This ratio is a standard indicator of asset quality and risk-taking behavior in banking studies (Maghyereh & Awartani, 2014). Leverage, bank size (natural logarithm of total assets), and risk management quality are included as control variables. Risk management quality (RMQ) is constructed as a composite index capturing banks' internal risk governance effectiveness. The index aggregates risk monitoring, credit assessment, compliance, internal controls, and external audit quality using predefined weights and standardized scoring criteria based on public

disclosures. Sub-components assess the quality of risk identification and reporting, credit evaluation and collection practices, regulatory compliance, internal control systems, and external audit outcomes. The composite RMQ index mitigates omitted-variable bias related to internal risk governance.

All data are analyzed using Partial Least Squares Structural Equation Modeling (SEM-PLS) with WarpPLS version 8.0. SEM-PLS is selected due to the moderate sample size, the complexity of the research model involving multiple latent constructs, mediation and moderation effects, and the absence of strict multivariate normality assumptions. Moreover, the study emphasizes prediction-oriented analysis and theory extension rather than strict model confirmation, further supporting the use of PLS-SEM over covariance-based SEM. The structural analysis is conducted using two separate models: the first specifies market power as the dependent variable, while the second focuses on multidimensional efficiency outcomes. This separation allows clearer identification of the distinct strategic mechanisms underlying competition and efficiency.

To address potential institutional heterogeneity between ASEAN and MENA banking systems, a multi-group analysis (MGA) is conducted. Configural invariance is ensured by applying identical construct definitions, indicators, and model specifications across both regional subsamples. Compositional equivalence is assessed by examining the consistency of indicator loadings, weights, and multicollinearity diagnostics across groups, following established PLS-SEM practices. The results indicate stable construct composition across regions, supporting the validity of cross-group structural comparisons. The Satterthwaite method is subsequently applied to test for statistically significant differences in path coefficients between ASEAN and MENA banks.

4. Results

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics for all variables across the full sample and by regional classification (ASEAN and MENA). Overall, the statistics reveal substantial heterogeneity in bank characteristics, business models, and operational conditions across regions.

Table 2. Descriptive statistics by regional classification.

Variables	All Countries			ASEAN			Obs.	MENA	
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.		Mean	Std. Dev.
NNIN	8821.20	3927.56	10,244.92	12,483.42	8801.49	11,260.67	4450.16	1608.70	6632.12
Z-Score	54.91	43.43	37.35	67.93	63.04	39.70	39.38	29.46	27.18
LI	0.9736	0.9745	0.0121	0.9751	0.9772	0.0133	0.9718	0.9729	0.0102
TE	0.7841	0.8265	0.1901	0.7327	0.7465	0.2086	0.8454	0.8735	0.1432
SE	0.9031	0.9740	0.1409	0.8608	0.9530	0.1661	0.9536	0.9805	0.0775
AE	0.7245	0.7290	0.1801	0.6963	0.7110	0.1916	0.7580	0.7515	0.1592
NPL	3.6250	3.5017	1.9435	3.0930	3.0897	1.7381	4.2598	3.9755	1.9872
CI	0.5160	0.5689	0.4483	0.4127	0.1664	0.4423	0.6393	0.9020	0.4241
Leverage	1.3543	1.3475	0.3193	1.3071	1.3136	0.2856	1.4106	1.4340	0.3475
RMQ	0.7790	0.7796	0.1035	0.8042	0.7931	0.0770	0.7489	0.7395	0.1217
Bank Size	12.3789	12.4933	1.5401	12.6834	12.9059	1.5658	12.0154	12.0383	1.4286
DTM	0.5484	0.5432	0.0948	0.5360	0.5282	0.1008	0.5632	0.5599	0.0849
CGQ	0.5761	0.5658	0.1062	0.5964	0.5819	0.1222	0.5518	0.5554	0.0767
MDL	0.4212	0.4144	0.1031	0.3897	0.3804	0.0930	0.4588	0.4510	0.1021

Banks in ASEAN exhibit markedly higher levels of business model diversification, as reflected in the mean non-interest income (NNIN), compared to their counterparts in the MENA region. This suggests a stronger reliance on fee-based and non-traditional income sources in ASEAN banking systems. Financial stability, measured by the Z-score, also

appears considerably higher in ASEAN, indicating a greater distance to default and more resilient balance sheets relative to banks in the MENA region.

Market power, proxied by the Lerner Index, is high across both regions, with limited dispersion, suggesting relatively concentrated banking markets. However, efficiency patterns differ notably. MENA banks demonstrate higher average technical, scale, and allocative efficiency, accompanied by lower variability, implying more consistent operational performance. In contrast, ASEAN banks exhibit greater dispersion in efficiency scores, particularly in terms of technical and scale efficiency, reflecting the heterogeneous production structures and competitive environments within the region.

Risk and organizational characteristics further distinguish the regions. ASEAN banks report lower non-performing loan ratios and higher risk management quality (RMQ), while MENA banks exhibit greater institutional complexity (CI) and higher leverage. ASEAN banks are, on average, larger in size and display slightly stronger corporate governance quality (CGQ). In contrast, MENA banks show higher levels of digital transformation maturity (DTM) and market digitalization (MDL), indicating more advanced digital environments at the country level.

Taken together, these descriptive patterns underscore meaningful regional differences in stability, diversification, efficiency, governance, and digitalization, justifying the subsequent structural and multi-group analyses.

4.2. Correlation Analysis of Latent Variables

This study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to investigate the relationships between banks' strategic characteristics, stability, market power, multidimensional efficiency, and contextual factors, evaluating the measurement model prior to structural estimation to ensure construct validity. Because all latent variables in this study are operationalized as single-item constructs based on standardized secondary financial data and composite indices, traditional internal consistency reliability tests, such as Cronbach's alpha and composite reliability (CR), are not applicable as their values are inherently fixed at 1.000. Consequently, the measurement model evaluation focuses on discriminant validity and collinearity diagnostics to ensure construct distinctiveness and model stability, using latent variable correlation analysis to confirm that all pairwise correlations remain below the commonly accepted threshold of 0.70 (MacKenzie et al., 2005).

Discriminant validity is assessed using latent variable correlation analysis. As reported in Tables 3 and 4, all pairwise correlations among latent constructs remain below the commonly accepted threshold of 0.70, indicating satisfactory discriminant validity (MacKenzie et al., 2005). These results confirm that the constructs capture conceptually distinct dimensions and are appropriate for subsequent structural model estimation.

Table 3. Correlation Matrix of Latent Variables: Market Power Model.

	1	2	3	4	5	6	7	8	9
1. NNIN	1.000								
2. Z-Score	0.471 ***	1.000							
3. LI	0.529 ***	0.603 ***	1.000						
4. CGQ	0.429 ***	0.663 ***	0.578 ***	1.000					
5. NPL	−0.077 **	−0.205 ***	−0.040	−0.450 ***	1.000				
6. CI	−0.154 ***	−0.633 ***	0.011	−0.311 ***	0.113 ***	1.000			
7. Leverage	−0.162 ***	−0.196 ***	−0.181 ***	−0.456 ***	0.607 ***	0.049 ***	1.000		
8. Size	0.219 ***	0.146 ***	0.114 ***	0.378 ***	−0.479 ***	0.051 ***	−0.400 ***	1.000	
9. RMQ	0.126 ***	0.287 ***	0.166 ***	0.446 ***	−0.397 ***	−0.164 ***	−0.347 ***	0.245 ***	1.000

Note: ** $p < 0.05$; *** $p < 0.01$.

Table 4. Correlation Matrix of Latent Variables: Multidimensional Efficiency Model.

	1	2	3	4	5	6	7	8	9	10
1. NNIN	1.000									
2. Z-Score	0.471 ***	1.000								
3. Leverage	−0.162 ***	−0.196 ***	1.000							
4. Size	0.219 ***	0.146 ***	−0.400 ***	1.000						
5. RMQ	0.126 ***	0.287 ***	−0.347 ***	0.245 ***	1.000					
6. TE	−0.086 **	−0.092 **	−0.271 ***	−0.057	−0.098 **	1.000				
7. SE	−0.588 ***	−0.325 ***	0.181 ***	−0.295 ***	−0.128 ***	0.095 **	1.000			
8. AE	−0.117 ***	−0.153 ***	−0.115 ***	−0.025	0.046	0.303 ***	0.001	1.000		
9. DTM	0.385 ***	0.320 ***	−0.760 ***	0.545 ***	0.462 ***	0.027	−0.335 ***	0.069 *	1.000	
10. MDL	0.130 ***	0.131 ***	−0.210 ***	0.190 ***	0.329 ***	0.237 ***	−0.155 ***	0.245 ***	0.296 ***	1.000

Note: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

4.3. Measurement Model Assessment

The adequacy of the measurement and structural models was evaluated using the PLS-SEM model fit and quality criteria provided by WarpPLS, as summarized in Table 5. Overall, the results indicate that both Model 1 (Market Power) and Model 2 (Efficiency) meet the recommended thresholds for goodness-of-fit, multicollinearity, and predictive relevance, supporting the robustness of subsequent hypothesis testing.

Table 5. PLS-SEM Model Fit and Measurement Indicators.

Criterion	Model 1: Market Power	Model 2: Efficiency	Threshold/Cut-Off	Information
Model Fit Indices				
APC	0.232 ($p < 0.001$)	0.153 ($p < 0.001$)	$p < 0.05$	Significant
ARS	0.561 ($p < 0.001$)	0.265 ($p < 0.001$)	$p < 0.05$	Significant
AARS	0.558 ($p < 0.001$)	0.259 ($p < 0.001$)	$p < 0.05$	Significant
AVIF	1.734	1.581	≤ 3.3 (Ideal)	Ideal
AFVIF	2.855	1.846	≤ 3.3 (Ideal)	Robust
Tenenhaus GoF	0.749	0.515	≥ 0.36 (Large)	Large Fit
SPR	0.889	0.864	≥ 0.700 , Ideal = 1.000	Acceptable
RSCR	0.980	0.985	≥ 0.900 , Ideal = 1.000	Ideal
SSR	1.000	0.864	≥ 0.700	Acceptable
R-Squared (R^2)			Kock and Lynn (2012)	
LI	0.668		$0.25 \leq R_s \leq 0.70$	Moderate
TE		0.248	$0.25 \leq R_s \leq 0.70$	Weak
SE		0.526	$0.25 \leq R_s \leq 0.70$	Moderate
AE		0.109	$0.25 \leq R_s \leq 0.70$	Weak
Adj. R-Squared			Kock and Lynn (2012)	
LI	0.664		$0.25 \leq R_s \leq 0.70$	Moderate
TE		0.240	$0.25 \leq R_s \leq 0.70$	Weak
SE		0.521	$0.25 \leq R_s \leq 0.70$	Moderate
AE		0.100	$0.25 \leq R_s \leq 0.70$	Weak
Stone-Geisser Q^2			Stone (1974)	
LI	0.561		> 0 (Relevant)	Predictive Value
TE		0.224	> 0 (Relevant)	Predictive Value
SE		0.511	> 0 (Relevant)	Predictive Value
AE		0.118	> 0 (Relevant)	Predictive Value

In terms of global model fit, the Average Path Coefficient (APC), Average R-squared (ARS), and Average Adjusted R-squared (AARS) are all statistically significant at the 1% level in both models, indicating that the structural relationships are jointly meaningful. The Tenenhaus Goodness-of-Fit (GoF) values of 0.749 for Model 1 and 0.515 for Model 2 exceed the cut-off for a large effect size (≥ 0.36), suggesting strong overall explanatory power.

Multicollinearity diagnostics further confirm model adequacy. The Average Variance Inflation Factor (AVIF) and Average Full Collinearity VIF (AFVIF) values for both models are well below the conservative threshold of 3.3, indicating that multicollinearity is not a concern and that the estimated path coefficients are stable. In addition, the Sympton's Paradox Ratio (SPR), R-squared Contribution Ratio (RSCR), and Statistical Suppression Ratio (SSR) meet or exceed their respective minimum requirements, providing further evidence of a well-specified model without pathological suppression effects.

Regarding explanatory power, the R-squared values indicate moderate explanatory strength for market power (LI) and scale efficiency (SE). In contrast, technical efficiency (TE) and allocative efficiency (AE) exhibit relatively weaker explanatory levels. A similar pattern is observed for the adjusted R-squared values, suggesting that efficiency outcomes—particularly TE and AE—are influenced by additional operational and institutional factors beyond the core variables included in the model. This finding is consistent with the notion that bank efficiency is inherently multidimensional and heterogeneous across efficiency components.

Finally, the Stone–Geisser Q^2 values for all endogenous constructs are positive, confirming adequate predictive relevance for both models. Collectively, these results demonstrate that the measurement and structural specifications are statistically sound, free from critical estimation issues, and suitable for analyzing the determinants of bank market power and multidimensional efficiency.

4.4. Determinants of Bank Market Power: Structural Model Analysis

The structural model results for bank market power are presented in Table 6, while the estimated path coefficients and interaction effects are visually summarized in Figure 2. Overall, the findings provide strong empirical support for the proposed direct and mediated relationships, with selective evidence for moderation effects. In addition to path coefficients, Cohen's f^2 effect sizes are reported to evaluate the substantive impact of each predictor, where values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively.

Table 6. Path Coefficients and Hypothesis Testing for Market Power Model.

Hypothesis	Path Relationship	Coeff (β)	<i>p</i> -Value	Effect Size (f^2)	Result
Direct Effects					
H1	NNIN $\rightarrow$ LI	0.356	<0.001	0.192	Supported
H2	Z-Score $\rightarrow$ LI	0.243	<0.001	0.154	Supported
Mediation Effect					
H5	Z-Score $\rightarrow$ CGQ $\rightarrow$ LI	0.179	<0.001	0.113	Supported (Partial)
Moderation Effects					
H6	NPL $\times$ Z-Score $\rightarrow$ LI	−0.007	0.425	0.002	Not Supported
H7	CI $\times$ Z-Score $\rightarrow$ LI	−0.243	<0.001	0.115	Supported
Control Variables					
	Bank Size $\rightarrow$ LI	0.195	<0.001	0.072	Significant (+)
	Financial Leverage $\rightarrow$ LI	−0.010	0.399	0.002	Insignificant
	RMQ $\rightarrow$ LI	−0.091	0.008	0.023	Significant (−)

Note: (+) denotes a significant positive relationship; (−) denotes a significant negative relationship.

Regarding the direct effects, business model diversification (NNIN), shows a positive and statistically significant relationship with market power ($\beta = 0.356$, $p < 0.001$). This confirms H1 and suggests that as banks shift toward non-traditional income streams, they enhance their competitive positioning, evidenced by a medium-to-large effect size ($f^2 = 0.192$). Financial stability (Z-score) also exhibits a positive and significant effect on market power ($\beta = 0.243$, $p < 0.001$), supporting H2 with a medium effect size ($f^2 = 0.154$).

This indicates that stable banks possess the strategic “buffers” necessary to exert greater pricing power in the market.

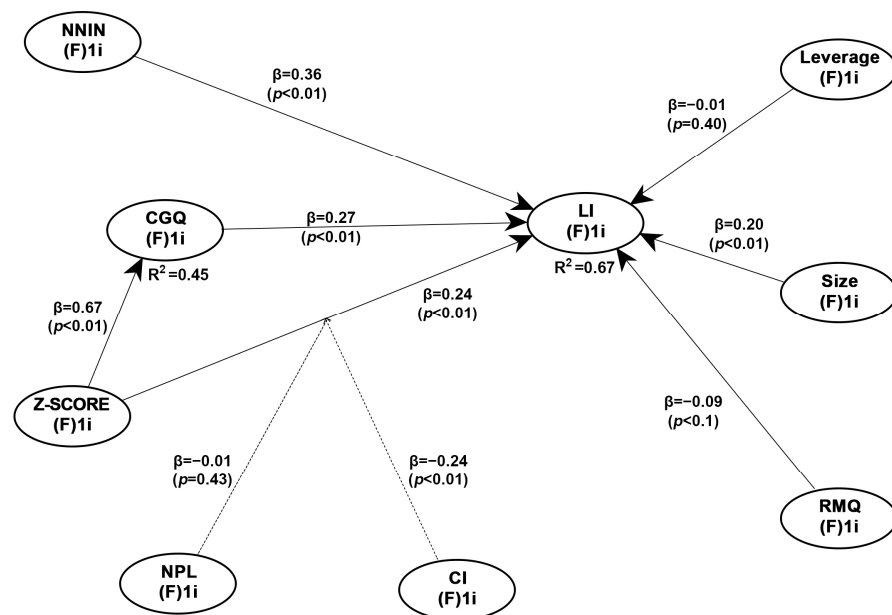


Figure 2. Summary of Direct, Mediating, and Moderating Effects on Market Power.

The mediation analysis further reveals a significant indirect effect of financial stability (Z-score) on market power (LI) through the quality of corporate governance (CGQ). As reported in Table 6, the indirect path from Z-score to CGQ and subsequently to market power is positive and statistically significant ($\beta = 0.179$, $p < 0.001$), indicating partial mediation and supporting H5. This suggests that the impact of stability on market power is partially explained by improved governance mechanisms ($f^2 = 0.113$), which facilitate more disciplined strategic expansion.

In terms of moderation effects, the interaction between NPL and financial stability is statistically insignificant ($\beta = -0.007$, $p = 0.425$), thus failing to support H6 and yielding a negligible effect size ($f^2 = 0.002$). Conversely, the interaction between the complexity index (CI) and financial stability (Z-Score) is negative and significant ($\beta = -0.243$, $p < 0.001$), providing strong support for H7 with a moderate substantive impact ($f^2 = 0.115$). This implies that high institutional complexity acts as a structural friction, diminishing the positive influence of stability on market power.

Regarding the control variables, bank size exhibits a positive and statistically significant effect on market power ($\beta = 0.195$, $p < 0.001$). Financial leverage does not show a significant relationship with market power ($\beta = -0.010$, $p = 0.399$). Risk management quality (RMQ) exhibits a statistically significant negative effect on market power ($\beta = -0.091$, $p = 0.008$). This suggests that rigorous risk monitoring may constrain aggressive pricing strategies associated with high market power.

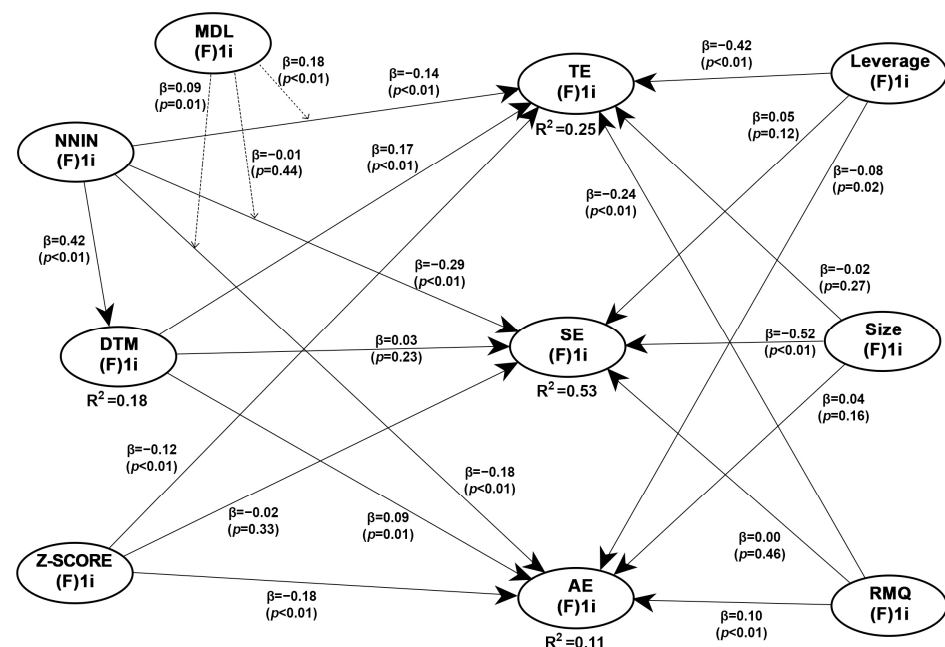
4.5. Determinants of Bank Efficiency: Structural Model Analysis

The structural model results for bank efficiency are presented in Table 7, with the estimated path relationships visualized in Figure 3. Bank efficiency is assessed using three dimensions, namely technical efficiency (TE), scale efficiency (SE), and allocative efficiency (AE), allowing for a comprehensive evaluation of efficiency determinants.

Table 7. Path Coefficients and Hypothesis Testing for Efficiency Model.

Hypothesis	Path Relationship	Coeff (β)	p -Value	Effect Size (f^2)	Result
Direct Effects					
H3a	NNIN $\rightarrow$ TE	−0.142	<0.001	0.023	Not Supported
H3b	NNIN $\rightarrow$ SE	−0.285	<0.001	0.171	Not Supported
H3c	NNIN $\rightarrow$ AE	−0.181	<0.001	0.038	Not Supported
H4a	Z-Score $\rightarrow$ TE	−0.123	<0.001	0.021	Not Supported
H4b	Z-Score $\rightarrow$ SE	−0.016	0.333	0.006	Not Supported
H4c	Z-Score $\rightarrow$ AE	−0.176	<0.001	0.032	Not Supported
Mediation Effect					
H8a	NNIN $\rightarrow$ DTM $\rightarrow$ TE	0.072	0.004	0.012	Supported (Partial)
H8b	NNIN $\rightarrow$ DTM $\rightarrow$ SE	0.012	0.330	0.007	Not Supported
H8c	NNIN $\rightarrow$ DTM $\rightarrow$ AE	0.036	0.093	0.008	Not Supported
Moderation Effects					
H9a	MDL $\times$ NNIN $\rightarrow$ TE	0.176	<0.001	0.020	Supported
H9b	MDL $\times$ NNIN $\rightarrow$ SE	−0.006	0.440	0.002	Not Supported
H9c	MDL $\times$ NNIN $\rightarrow$ AE	0.088	0.011	0.011	Supported
Control Variables					
	Bank Size $\rightarrow$ TE	−0.024	0.265	0.002	Insignificant
	Bank Size $\rightarrow$ SE	−0.524	<0.001	0.352	Significant (−)
	Bank Size $\rightarrow$ AE	0.039	0.157	0.004	Insignificant
	Financial Leverage $\rightarrow$ TE	−0.422	<0.001	0.125	Significant (−)
	Financial Leverage $\rightarrow$ SE	0.045	0.118	0.008	Insignificant
	Financial Leverage $\rightarrow$ AE	−0.078	0.020	0.010	Significant (−)
	RMQ $\rightarrow$ TE	−0.237	<0.001	0.045	Significant (−)
	RMQ $\rightarrow$ SE	0.004	0.462	0.000	Insignificant
	RMQ $\rightarrow$ AE	0.101	0.004	0.011	Significant (−)

Note: (−) denotes a significant negative relationship.

**Figure 3.** Summary of Direct, Mediating, and Moderating Effects on Efficiency.

Regarding the direct effects, business model diversification (NNIN) exhibits negative and statistically significant relationships with all three efficiency measures. Specifically, NNIN has a negative effect on technical efficiency ($\beta = -0.142$, $p < 0.001$), scale efficiency ($\beta = -0.285$, $p < 0.001$), and allocative efficiency ($\beta = -0.181$, $p < 0.001$), indicating that aggressive diversification may lead to resource fragmentation. While the effects on TE

and AE are small ($f^2 < 0.05$), the impact on SE is medium-to-large ($f^2 = 0.171$), suggesting significant scale diseconomies; thus, H3a, H3b, and H3c are not supported. Similarly, financial stability (Z-score) has a negative impact on technical efficiency ($\beta = -0.123$, $p < 0.001$) and allocative efficiency ($\beta = -0.176$, $p < 0.001$), while its relationship with scale efficiency is statistically insignificant ($\beta = -0.016$, $p = 0.333$), results in the rejection of H4a, H4b, and H4c, potentially reflecting a “quiet life” effect where higher stability reduces the incentive for cost-minimizing behavior.

The mediation analysis indicates limited support for the role of digital transformation (DTM). DTM partially mediates the relationship between NNIN and technical efficiency with a significant positive indirect effect ($\beta = 0.072$, $p = 0.004$), supporting H8a. This suggests that internal digitalization can mitigate some of the efficiency losses associated with diversification. However, the indirect effects for scale efficiency ($\beta = 0.012$, $p = 0.330$) and allocative efficiency ($\beta = 0.036$, $p = 0.093$) are insignificant, leading to the rejection of H8b and H8c, with negligible substantive impacts ($f^2 < 0.01$).

Regarding moderation effects, market digitalization (MDL) significantly moderates the relationship between NNIN and technical efficiency ($\beta = 0.176$, $p < 0.001$), supporting H9a. Furthermore, the moderating effect on allocative efficiency is positive and significant ($\beta = 0.088$, $p = 0.011$), supporting H9c. These results imply that a mature external digital ecosystem (MDL) can help banks extract better value from diversification, although the substantive effect sizes remain small ($f^2 \leq 0.02$). The interaction for SE remains insignificant, failing to support H9b.

Regarding control variables, bank size (log of total assets) has a statistically significant negative effect on scale efficiency ($\beta = -0.524$, $p < 0.001$), while its effects on technical efficiency ($\beta = -0.024$, $p = 0.265$) and allocative efficiency ($\beta = 0.039$, $p = 0.157$) are not statistically significant. Financial leverage has a negative impact on technical efficiency ($\beta = -0.422$, $p < 0.001$) and allocative efficiency ($\beta = -0.078$, $p = 0.020$), but does not significantly affect scale efficiency ($\beta = 0.045$, $p = 0.118$). Risk management quality (RMQ) is negatively associated with technical efficiency ($\beta = -0.237$, $p < 0.001$) and allocative efficiency ($\beta = 0.101$, $p = 0.004$), while its relationship with scale efficiency is not statistically significant ($\beta = 0.004$, $p = 0.462$). This reflecting the high operational and monitoring costs inherent in complex, highly leveraged banking environments.

4.6. Multi-Group Analysis Results (ASEAN vs. MENA)

This study further employs Multi-Group Analysis (MGA) to examine whether the structural relationships differ significantly between banks operating in ASEAN and MENA regions. The results of the MGA are reported in Table 8, with statistically significant group differences identified based on the absolute difference in path coefficients.

For the direct effects on market power, the relationship between business model diversification (NNIN) and market power (LI) is positive in both regions, with a coefficient of 0.227 for ASEAN and 0.304 for MENA, although the difference between the two groups is not statistically significant ($\Delta\beta = 0.076$). In contrast, the effect of financial stability (Z-score) on market power varies substantially across regions, reflecting differing risk-return trade-offs. The Z-score exhibits a negative coefficient in ASEAN ($\beta = -0.119$) but a positive and stronger coefficient in MENA ($\beta = 0.442$), with a statistically significant group difference ($\Delta\beta = 0.561$, $p < 0.01$), supporting the presence of regional heterogeneity for H2. This suggests that in MENA, financial stability is a prerequisite for competitive dominance, whereas ASEAN banks may sacrifice short-term stability to capture market share in a more fragmented environment.

Table 8. Summary of Group Differences and Structural Path Comparisons (ASEAN vs. MENA).

Hypothesis	Path Relationship	ASEAN (β)	MENA (β)	Abs. Different (β)
Direct Effects				
H1	NNIN $\rightarrow$ LI	0.227	0.304	0.076
H2	Z-Score $\rightarrow$ LI	−0.119	0.442	0.561 **
H3a	NNIN $\rightarrow$ TE	0.023	−0.075	0.098
H3b	NNIN $\rightarrow$ SE	−0.243	0.174	0.417 **
H3c	NNIN $\rightarrow$ AE	0.037	−0.155	0.192 **
H4a	Z-Score $\rightarrow$ TE	−0.114	0.035	0.149 *
H4b	Z-Score $\rightarrow$ SE	−0.064	0.087	0.152 *
H4c	Z-Score $\rightarrow$ AE	−0.212	−0.107	0.105
Moderation Effects				
H6	NPL $\times$ Z-Score $\rightarrow$ LI	−0.115	0.147	0.263 **
H7	CI $\times$ Z-Score $\rightarrow$ LI	−0.216	−0.129	0.087
H9a	MDL $\times$ NNIN $\rightarrow$ TE	0.118	−0.199	0.317 **
H9b	MDL $\times$ NNIN $\rightarrow$ SE	−0.086	−0.321	0.234 **
H9c	MDL $\times$ NNIN $\rightarrow$ AE	0.398	−0.089	0.487 **
Control Variables				
	Bank Size $\rightarrow$ LI	0.154	−0.057	0.211 **
	Financial Leverage $\rightarrow$ LI	−0.064	−0.042	0.022
	RMQ $\rightarrow$ LI	0.098	0.105	0.007
	Bank Size $\rightarrow$ TE	0.151	−0.130	0.281 **
	Bank Size $\rightarrow$ SE	−0.748	−0.495	0.253 **
	Bank Size $\rightarrow$ AE	0.224	−0.015	0.239 **
	Financial Leverage $\rightarrow$ TE	−0.524	−0.265	0.259 **
	Financial Leverage $\rightarrow$ SE	0.025	0.013	0.012
	Financial Leverage $\rightarrow$ AE	−0.057	−0.027	0.030
	RMQ $\rightarrow$ TE	−0.200	−0.122	0.078
	RMQ $\rightarrow$ SE	−0.015	0.118	0.133 *
	RMQ $\rightarrow$ AE	0.123	0.097	0.026

Note: * p -Value < 0.05; ** p -Value < 0.01.

Regarding efficiency-related direct effects, the relationship between NNIN and technical efficiency is weak in both regions and does not show a statistically significant difference ($\Delta\beta = 0.098$). However, significant regional differences are observed for scale efficiency and allocative efficiency. The effect of NNIN on scale efficiency is negative in ASEAN ($\beta = -0.243$) but positive in MENA ($\beta = 0.174$), with a significant difference between the two groups ($\Delta\beta = 0.417$, $p < 0.01$). This indicates that MENA banks successfully leverage diversification to achieve economies of scope, while ASEAN banks face scale diseconomies when expanding into non-interest activities. Similarly, NNIN shows a positive coefficient for allocative efficiency in ASEAN ($\beta = 0.037$) and a negative coefficient in MENA ($\beta = -0.155$), with a statistically significant difference ($\Delta\beta = 0.192$, $p < 0.01$).

The effects of financial stability on efficiency also vary across regions. The relationship between the Z-score and technical efficiency is negative in ASEAN ($\beta = -0.114$) and positive in MENA ($\beta = 0.035$), with a significant group difference ($\Delta\beta = 0.149$, $p < 0.05$). A similar pattern is observed for scale efficiency, where the Z-score has a negative coefficient in ASEAN ($\beta = -0.064$) and a positive coefficient in MENA ($\beta = 0.087$), with the difference being statistically significant ($\Delta\beta = 0.152$, $p < 0.05$). In contrast, the effect of the Z-score on allocative efficiency does not differ significantly between the two regions ($\Delta\beta = 0.105$). These findings highlight that financial stability acts as a driver of operational discipline in the MENA region, whereas it may lead to managerial slack or a “quiet life” effect in ASEAN.

For moderation effects related to market power, the interaction between non-performing loans (NPL) and the Z-score shows opposite signs across regions, with a negative coefficient in ASEAN ($\beta = -0.115$) and a positive coefficient in MENA ($\beta = 0.147$). The difference between the two groups is statistically significant ($\Delta\beta = 0.263$, $p < 0.01$). The moderating effect of the complexity index (CI) on the Z-score–market power relationship is negative in both regions and does not exhibit a significant group difference ($\Delta\beta = 0.087$). This suggests that high credit risk exacerbates stability-competition trade-offs in ASEAN but may incentivize more aggressive market power preservation in MENA.

Substantial regional heterogeneity is also evident in the moderation effects on efficiency. The interaction between market discipline (MDL) and NNIN on technical efficiency is positive in ASEAN ($\beta = 0.118$) but negative in MENA ($\beta = -0.199$), with a statistically significant difference ($\Delta\beta = 0.317$, $p < 0.01$). Similarly, the moderating effect of MDL on scale efficiency is negative in both regions, although it is stronger in MENA ($\beta = -0.321$) than in ASEAN ($\beta = -0.086$), with a significant group difference ($\Delta\beta = 0.235$, $p < 0.01$). This divergence highlights that the advanced digital maturity of the ASEAN market acts as a catalyst for efficiency gains under diversification, whereas in MENA, rapid digitalization might still represent an operational cost burden for diversifying banks. For allocative efficiency, the MDL $\times$ NNIN interaction is strongly positive in ASEAN ($\beta = 0.398$) but negative in MENA ($\beta = -0.089$), with the largest observed group difference ($\Delta\beta = 0.487$, $p < 0.01$).

Regarding control variables, several statistically significant regional differences are observed. Bank size exhibits a positive effect on market power in ASEAN ($\beta = 0.154$) but a negative effect in MENA ($\beta = -0.057$), with a significant difference ($\Delta\beta = 0.211$, $p < 0.01$). Bank size also shows significant group differences across all efficiency measures, with positive effects on technical and allocative efficiency in ASEAN but negative or weaker effects in MENA. Financial leverage exhibits significant regional differences in technical efficiency, with a stronger negative effect in ASEAN ($\beta = -0.524$) compared to MENA ($\beta = -0.265$). In contrast, no significant differences are observed for scale and allocative efficiency. Finally, risk management quality (RMQ) shows a significant regional difference only for scale efficiency ($\Delta\beta = 0.133$, $p < 0.05$). In contrast, its effects on market power, technical efficiency, and allocative efficiency do not differ significantly between the two regions.

4.7. Robustness and Endogeneity Assessment

To ensure the stability of the findings and address potential endogeneity, this study conducted a formal robustness check using Warp3 bivariate causal direction ratios. This test was specifically chosen as it offers a robust mechanism for identifying potential reverse causality without the need for external instrumental variables, which are often difficult to validate in cross-country banking research. The ratios evaluate whether the hypothesized causal flow from the independent and control variables to the dependent variables is statistically stronger than the reverse relationships. The results for the two separate structural models (market power and multidimensional efficiency) are summarized in Table 9.

The results indicate that the majority of the ratios for the primary strategic variables (NNIN and Z-Score) exceed the threshold of 1.0, particularly in the Market Power and Scale Efficiency (SE) models. This confirms that the hypothesized causal directions are statistically supported over their reverse counterparts. While some dimensions of technical efficiency (TE) and allocative efficiency (AE) show lower ratios, suggesting more complex bidirectional dynamics in resource management, the overall stability of the coefficients remains intact.

Table 9. Robustness Assessment: Warp3 Bivariate Causal Direction Ratios.

Path Relationship	Model 1: Market Power	Model 2: Efficiency			Information
		TE	SE	AE	
Business Model (NNIN)	1.092	0.521	1.012	0.749	Weak Support
Stability (Z-Score)	1.031	0.697	0.982	1.076	Weak Support
Bank Size	1.145	0.682	0.623	0.454	Weak Support
Financial Leverage	1.088	0.948	1.318	0.967	Weak/Medium Support
RMQ	1.210	0.681	1.469	1.137	Weak/Medium Support

Note: Warp3 bivariate causal direction ratios; ratio > 1 supports hypothesized link; $1 < \text{ratio} \leq 1.3$: weak support; $1.3 < \text{ratio} \leq 1.7$: medium; $1.7 < \text{ratio}$: strong.

Furthermore, the consistency of these findings is bolstered by the multi-group analysis (MGA) conducted across the ASEAN and MENA regions, which confirm that the structural relationships are robust to institutional heterogeneity. Finally, the use of the Warp3 algorithm ensures that the results are stable across both linear and non-linear functional forms, mitigating risks associated with model specification bias.

5. Discussion

The empirical findings of this study offer a nuanced understanding of how business model diversification, financial stability, governance mechanisms, and digital transformation collectively shape bank market power and efficiency. By analyzing conventional banks across the ASEAN and MENA regions, the results reveal distinct pathways for market dominance versus operational efficiency. These findings explain how institutional and digital factors help banks navigate the diversification discount and the quiet life trap, where strategic expansion often conflicts with cost discipline.

The positive and statistically significant effect of business model diversification (NNIN) on market power supports the premise that expanding into non-interest activities strengthens a bank's competitive positioning. This finding directly addresses the pressure on banks to reconfigure their business models due to compressed net interest margins in low-interest environments. It aligns with the Structure-Conduct-Performance (SCP) paradigm and corroborates evidence from [Setianto et al. \(2025\)](#). Diversification enhances market power by stabilizing revenue and enabling favorable pricing strategies. Furthermore, banks generating more revenue from non-interest sources enjoy higher margins because these niche markets face less intense competition ([Das & Pati, 2025](#)). By reducing reliance on interest income, banks can cross-subsidize products and create higher switching costs for customers, thereby consolidating their market dominance.

In parallel, financial stability, proxied by the Z-score, exhibits a strong positive association with market power. This suggests that stability acts as a strategic resource, reinforcing the Resource-Based View (RBV) perspective that internal capabilities drive competitive strength. Higher stability allows for banks to protect their franchise value and signal reliability to the market ([Louhichi et al., 2019](#)). As noted by [Qori'ah et al. \(2025\)](#) and [Wu et al. \(2019\)](#), stable banks possess the capital buffers necessary to absorb shocks and maintain lending during downturns, effectively "buying" market share when weaker competitors retreat.

However, stability alone is insufficient without effective oversight. The significant mediating role of corporate governance quality (CGQ) indicates that stability requires robust mechanisms to direct financial resources toward value-creating strategies. This finding echoes the governance challenges, where information asymmetry can obscure risk. Board structure remains a significant determinant of financial stability ([Mamatzakakis et al., 2023](#)). Furthermore, [Bhatia \(2024\)](#) demonstrated that adherence to governance

standards, such as effective boards and transparency, is crucial for enhancing profitability and resilience, particularly in low-competition environments.

Crucially, this study identifies structural frictions that limit the benefits of stability. The negative moderation of institutional complexity on the stability–market power nexus supports the “diseconomies of complexity” argument. As banks expand their product portfolios and geographic reach, they develop complex structures that increase monitoring costs (Laeven et al., 2016). Consequently, even financially stable banks may fail to leverage their capital effectively if their complex structures slow down decision-making or obscure risk signals, a view supported by Krause et al. (2017). While the aggregate moderation of non-performing loans (NPLs) was less dominant, the theoretical underpinning suggests that high NPLs can drain managerial attention, as noted by Berger and DeYoung (1997), effectively severing the link between stability and aggressive market expansion due to the burden of bad management.

Turning to operational performance, the results reveal a dark side to diversification and stability in terms of efficiency. The negative association between business model diversification and multiple efficiency dimensions strongly supports the diversification discount theory. Curi et al. (2015) and Elyasiani and Wang (2012) similarly found that diversification often destroys technical efficiency due to increased coordination costs and the complexity of managing disparate business lines. Likewise, the negative impact of financial stability on efficiency aligns with the quiet life hypothesis described by Ikeda et al. (2018). This hypothesis suggests that managers of highly stable and dominant banks may feel insulated from market discipline, leading to managerial slack where they avoid difficult cost-cutting decisions or underinvest in necessary innovations. Consequently, excessive stability can breed inefficiency, as managers prioritize safety over optimal resource utilization, a trend also observed by Miah and Uddin (2017).

This study’s most novel contribution lies in identifying digital transformation maturity (DTM) as the solution to this efficiency paradox. The positive mediation effect of DTM confirms that digitalization is the missing link that enables banks to manage the complexity of diversification efficiently. This supports Beccalli (2007) and Citterio et al. (2024), who argue that while IT investment alone may not yield immediate returns, the strategic adoption of digital channels and infrastructure can significantly reduce operating costs and enhance network efficiency. By automating processes, digital maturity allows diversified banks to overcome coordination costs, turning potential inefficiencies into productivity gains, as evidenced by Liu et al. (2024).

Moreover, the moderating role of market digitalization level (MDL) underscores the importance of the external environment. Banks in countries with robust digital infrastructure are better positioned to reap the efficiency benefits of their internal strategies (Cheng et al., 2021; Vuong et al., 2025). A mature ecosystem reduces transaction friction and facilitates the adoption of fintech innovations. As noted by Khera et al. (2022), the widespread adoption of digital financial services acts as a key driver for efficiency, amplifying the positive impact of diversification.

Finally, the Multi-Group Analysis reveals significant regional divergences. The stronger stability–market power link in the MENA region reflects its unique market structure, often characterized by high concentration and a reliance on economic stability tied to oil prices, as noted by Aliyu et al. (2023). In contrast, the ASEAN region shows more dynamic efficiency relationships. This is likely driven by its rapidly evolving digital landscape and intense fintech competition mentioned in the introduction. This heterogeneity highlights that “one-size-fits-all” policies are ineffective. MENA banks may benefit more from stability-enhancing governance reforms, while ASEAN banks need to prioritize digital

integration to manage the efficiency costs of diversification, aligning with the regional governance insights provided by [D. T. N. Nguyen \(2025\)](#).

6. Conclusions

This study examines how banks balance the dual strategic imperatives of securing market power and optimizing multidimensional operational efficiency, as measured by technical, scale, and allocative efficiency, within emerging and transitional banking systems. The findings demonstrate that business model diversification (NNIN) and financial stability play asymmetric roles across these two performance domains. While both factors are significantly associated with stronger market power, they are also linked to efficiency trade-offs across multiple dimensions.

This suggests that strategies aimed at competitive positioning and risk resilience do not automatically correlate with superior operational efficiency. The results further indicate that governance quality and digital transformation act as critical conditioning mechanisms in shaping these relationships. Corporate governance quality partially channels the associated stabilizing effects of financial soundness into market power, reinforcing the role of institutional oversight in transforming stability into strategic advantage.

At the same time, digital transformation maturity is associated with the mitigation of the efficiency losses linked to diversification, particularly regarding technical efficiency, while market digitalization level selectively amplifies or constrains the effectiveness of diversification strategies. The multi-group analysis reveals substantial regional heterogeneity, indicating that the relative importance of stability, diversification, and moderating mechanisms varies between ASEAN and MENA banking systems. These results reflect differences in institutional development and digital readiness, suggesting that the generalizability of the findings to other regions should be interpreted with caution.

Theoretically, this study advances the banking literature by integrating market power and multidimensional efficiency within a unified framework, demonstrating that their determinants operate through distinct, conditional pathways. By accounting for governance, risk, and digitalization, the findings refine views that treat diversification and stability as universally beneficial. From a practical perspective, the results suggest that bank managers should avoid a “one-size-fits-all” approach to strategic expansion. Specifically, managers must balance diversification-driven growth with targeted investments in digital transformation maturity, as internal digital maturity is essential to mitigate the coordination costs and “diversification discount” that often erode operational efficiency. For regulators, the findings imply that fostering financial stability alone is insufficient; they must also prioritize the development of a robust external market digitalization level and digital infrastructure. Such a supportive ecosystem ensures that banks can diversify their income streams and maintain stability without sacrificing efficiency, thereby promoting a more resilient and competitive banking landscape.

Several limitations should be acknowledged. The analysis relies on secondary indicators and a cross-sectional design, which means the observed relationships are reported as significant associations rather than definitive causal claims, in line with the inherent limitations of SEM. Additionally, while providing deep insights into ASEAN and MENA, the specific institutional contexts of these regions may limit the broader generalizability of the results to advanced economies. Future research could extend this framework using longitudinal data, alternative efficiency measures, or broader regional coverage to examine further how banks balance competitive power and operational efficiency under evolving institutional and digital conditions.

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Conflicts of Interest: Author Aina Zatil Aqmar is employed by the company Prosemora Consulting. The remaining authors declare that this research was conducted in the absence of any commercial or financial relationships that could be construed as potential conflicts of interest.

Appendix A

Table A1. Sample Distribution by Country and Region.

Region	Country	Number of Banks	Number of Observations
ASEAN	Cambodia	1	10
	Indonesia	5	50
	Laos	1	10
	Malaysia	6	60
	Philippines	7	70
	Singapore	3	30
	Thailand	9	90
	Vietnam	5	50
Subtotal ASEAN		37	370
MENA	Bahrain	2	20
	Egypt	3	30
	Iraq	1	10
	Jordan	2	20
	Kuwait	4	40
	Lebanon	2	20
	Malta	2	20
	Morocco	2	20
	Oman	2	20
	Palestine	1	10
	Qatar	3	30
	Saudi Arabia	3	30
	Tunisia	1	10
	United Arab Emirates	3	30
Subtotal MENA		31	310
Total Sample		68	680

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