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-RESEARCH ARTICLE-

FINTECH ADOPTION, BUSINESS DIVERSIFICATION, AND BANK PERFORMANCE: EVIDENCE FROM COMMERCIAL BANKS IN EMERGING ECONOMIES

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—Abstract—

This investigation explores the extent to which FinTech implementation and business diversification affect banking performance within emerging markets, where accelerating digital innovation continues to transform the delivery of financial services. The study seeks to evaluate the individual impacts of FinTech adoption and diversification, together with their combined influence, on organisational performance. Employing a quantitative explanatory approach, the research utilises panel data derived from 30 banks across a ten-year period (2014–2023), with empirical assessment conducted through Fixed Effects and Random Effects estimations. The findings reveal

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that both FinTech implementation ($\beta = 0.761$, $p < 0.01$) and business diversification ($\beta = 0.746$, $p < 0.01$) exert statistically significant positive effects on performance. The explanatory model accounts for 83.35% of the observed variance ($R^2 = 0.8335$). However, the interaction between the two variables does not demonstrate statistical significance. The study therefore determines that FinTech adoption and diversification operate as separate mechanisms enhancing banking performance. Accordingly, it advocates the systematic incorporation of digital innovations alongside carefully managed diversification strategies. Although the findings provide valuable theoretical and practical insights, their generalisability is constrained by reliance on simulated data and the relatively limited sample size.

Keywords: FinTech Adoption, Business Diversification, Bank Performance, Panel Data, Emerging Economies.

INTRODUCTION

Background of Study

Since financial technology (FinTech) continues to advance at an unprecedented pace, it has fundamentally reconfigured banking operations, particularly within emerging economies where progress in digital innovation has occurred alongside efforts to expand financial inclusion. Through the integration of FinTech solutions, banking institutions can streamline operational processes, reduce transaction-related expenses, and enhance customer experiences through technologies such as mobile banking platforms, blockchain applications, and artificial intelligence-driven systems (Ozili, 2018). The significance of FinTech is especially pronounced in emerging markets, where conventional banking infrastructure is often underdeveloped and operational efficiency remains comparatively constrained (Lee & Shin, 2018).

Concurrently, business diversification has emerged as a deliberate strategic mechanism through which banks seek to mitigate risk exposure and broaden their sources of income. By extending activities beyond traditional interest-based operations into areas such as digital financial services, insurance products, and investment-related offerings, banks may strengthen both revenue stability and long-term financial resilience (Amediku, 2012). The interplay between FinTech implementation and diversification strategies is particularly noteworthy because digital transformation equips banks with the capability to coordinate increasingly diverse business activities while simultaneously creating innovative value propositions. Existing empirical evidence suggests that FinTech adoption contributes positively to banking performance by improving operational efficiency, lowering costs, and enhancing service quality, although the magnitude of these effects varies according to institutional and economic environments (Phan et al., 2020). Likewise, the combined influence of technological innovation and diversification is increasingly recognised as an important determinant

of sustainable banking success across emerging economies (Liu et al., 2024).

The wider macro-financial landscape of emerging economies offers an important context for understanding the growing strategic importance of both FinTech and diversification. During the last decade, widespread smartphone adoption, the development of digital payment ecosystems, and the emergence of technology-oriented competitors have intensified pressure on established banks to modernise their business models. Evidence derived from thirty-three developing Asian economies demonstrates that FinTech adoption exerts a positive and statistically significant effect on banking performance, with the greatest improvements observed among institutions that initially exhibited weaker performance levels. This finding indicates that digital transformation may contribute to reducing competitive disparities within the banking sector (Iatzaz Ul Hassan et al., 2025). Nevertheless, these benefits are not universally guaranteed, as their extent depends substantially on the quality of governance structures and the institutional environment within which banks operate (Iatzaz Ul Hassan et al., 2025). Such findings align with broader observations that the diffusion of digital financial innovations across emerging markets has been uneven, reflecting variations in regulatory preparedness, technological capacity, and financial-sector development.

Despite widespread recognition of the transformative potential of digital technologies, scholarly findings concerning their impact on profitability remain far from conclusive. While numerous studies report that FinTech investments improve operational effectiveness and profitability, others identify either insignificant outcomes or adverse short-term effects once implementation costs and challenging macroeconomic conditions are considered (Elmahdy et al., 2025). The substantial financial commitments associated with digital infrastructure frequently delay the realisation of returns, while factors such as organisational scale and capital adequacy influence a bank's ability to absorb, deploy, and leverage technological innovations effectively (A. Khalil, 2026). The inconsistency of these findings highlights the importance of examining FinTech in conjunction with complementary strategic mechanisms rather than treating it as an isolated determinant of performance.

Business diversification constitutes one such strategic mechanism and has attracted increasing attention as banks seek to reduce dependence on traditional interest-based income streams. Through expansion into fee-based and other non-interest-generating activities, banks can diversify revenue sources and enhance their capacity to withstand economic fluctuations, particularly during periods of financial uncertainty (Adem, 2022). However, the effectiveness of diversification is contingent upon both the composition of non-interest income and the competitive environment in which a bank operates. Consequently, a diversification strategy that enhances profitability in one institutional setting may generate limited benefits or additional operational complexity in another (Pasha & Lewaaelhamd, 2024). Accordingly, the principal managerial

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challenge lies not merely in diversifying operations but in ensuring that diversification initiatives correspond with organisational resources and strategic capabilities.

More importantly, FinTech adoption and business diversification are increasingly viewed as interconnected organisational capabilities rather than independent strategic initiatives. The digitalisation of core banking functions enables institutions to manage a broader range of activities more efficiently, thereby supporting diversification efforts. Research informed by the Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT) indicates that the ability to identify opportunities, mobilise digital resources, and reconfigure organisational capabilities contributes significantly to improved banking performance, suggesting that technological competencies and strategic diversification can reinforce one another when effectively aligned (Abdurrahman et al., 2024). Furthermore, accumulating empirical evidence indicates that the performance benefits associated with FinTech are most likely to materialise when digital investments are embedded within a coherent strategic framework rather than pursued solely as technological modernisation initiatives (Tarawneh et al., 2024).

Collectively, these perspectives provide a compelling rationale for examining FinTech adoption and business diversification within a unified analytical framework. They underscore the importance of investigating not only the independent effects of these strategies but also their potential interaction in shaping banking performance. Such considerations establish the foundation for the problem statement presented in the subsequent section. They further justify the use of a multi-country panel design, as cross-national variation provides a valuable means of distinguishing institution-specific influences from the broader structural and environmental factors that affect the way FinTech adoption and diversification contribute to measurable organisational performance outcomes.

Problem Statement

Despite the growing strategic importance of FinTech adoption and business diversification, consensus regarding their combined influence on banking performance remains limited, particularly within emerging economies. While existing research has extensively examined the direct relationship between FinTech implementation and financial performance, considerably less attention has been devoted to understanding whether diversification influences or conditions this relationship (Lee & Shin, 2018). Consequently, important gaps remain concerning how these strategic initiatives operate collectively to shape organisational outcomes within increasingly digitalised banking environments. Furthermore, the accelerated adoption of digital technologies introduces a range of emerging challenges that may offset anticipated performance gains. These challenges include heightened operational vulnerabilities, cybersecurity threats, and evolving regulatory compliance requirements, all of which can impose substantial costs and uncertainties on banking institutions (Ozili, 2021). Although FinTech offers

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considerable opportunities to improve efficiency and service delivery, the associated risks may weaken the extent to which digital transformation translates into enhanced organisational performance.

Similarly, diversification strategies present both opportunities and challenges. While expanding into non-traditional business activities can strengthen revenue generation and reduce dependence on conventional income streams, diversification may also increase organisational complexity and create managerial inefficiencies when not supported by appropriate technological and operational capabilities (Amediku, 2012). Consequently, the effectiveness of diversification is likely to depend on the extent to which banks possess the technological resources and organisational capacity necessary to manage increasingly diverse activities efficiently. An additional concern arises from the substantial heterogeneity characterising emerging economies. Differences in regulatory environments, technological readiness, institutional quality, and levels of financial-sector development can significantly influence the effectiveness of FinTech implementation and its contribution to banking performance (Phan et al., 2020). As a result, findings generated within one jurisdiction may not necessarily be applicable to others, limiting the broader relevance of many existing studies.

Moreover, a considerable proportion of the current literature concentrates on single-country contexts, thereby restricting the generalisability of empirical conclusions across diverse emerging-market settings. This narrow geographical focus limits understanding of how variations in institutional and economic conditions shape the relationship between technological adoption, diversification strategies, and organisational performance. Accordingly, there remains a clear need for comprehensive empirical investigation employing multi-country panel data to evaluate the individual and combined effects of FinTech adoption and business diversification on banking performance across emerging economies. Such an approach can provide more robust and generalisable evidence regarding the extent to which these strategic mechanisms contribute to sustainable performance improvements within the contemporary banking sector.

Aim and Research Objectives

The principal aim of this study is to analyse the influence of FinTech adoption on banking performance within emerging economies while determining whether business diversification alters the nature or strength of this relationship. In addressing this aim, the study seeks to generate a more comprehensive understanding of how technological innovation and strategic diversification jointly contribute to organisational outcomes in the banking sector. The specific research objectives are:

- To determine the effect of FinTech adoption on the performance of banks operating in emerging economies.
- To investigate the influence of business diversification on bank performance.

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- To evaluate whether business diversification moderates the relationship between FinTech adoption and bank performance.

Significance of the Study

The proposed study contributes to the existing literature by providing empirical evidence on the interactive effects of FinTech adoption and business diversification in shaping bank performance. It extends prior research by integrating technological and strategic perspectives within a panel data framework, thereby enabling a more rigorous examination of these dynamics across emerging economies. From a practical standpoint, the findings offer valuable insights for bank managers and policymakers, particularly in designing strategies that effectively leverage digital transformation while simultaneously managing diversification activities. In addition, the study supports regulatory authorities in better understanding how the combined effects of digitalisation and diversification may influence financial stability, competitive dynamics, and overall sectoral resilience within emerging markets.

LITERATURE REVIEW

This section provides a critical review of the existing literature on FinTech adoption, business diversification, and banking performance. It also develops the underlying theoretical foundation and identifies the key research gaps that justify and motivate the present study.

FinTech Adoption and Bank Performance

The adoption of FinTech has substantially reshaped banking operations by enhancing efficiency, reducing transaction costs, and improving service delivery. The integration of advanced digital technologies such as artificial intelligence, blockchain, and mobile banking systems has enabled banks to streamline operational processes and introduce innovative financial products (Gomber et al., 2017). Empirical evidence further indicates a positive association between FinTech adoption and bank profitability, primarily through improved operational efficiency and expanded customer reach (Kayed et al., 2025). FinTech is particularly important in emerging economies, where it helps address structural infrastructure constraints and strengthens financial inclusion. Through digital platforms, banks are able to reach previously underserved populations, thereby increasing deposit mobilisation and expanding lending capacity (Banna et al., 2021).

However, the relationship between FinTech adoption and performance is not uniformly positive. Some studies suggest that potential benefits may be offset by high implementation costs, technological risks, and short-term disruptions to operational stability (Li et al., 2017). Moreover, FinTech adoption requires substantial investment in both digital infrastructure and human capital, which may initially suppress

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profitability before longer-term gains are realised. Therefore, a comprehensive assessment of FinTech's impact on banking performance must consider both its enabling effects and its associated costs and risks.

Business Diversification and Bank Performance

Business diversification is widely adopted as a strategic approach aimed at enhancing revenue stability and reducing exposure to risk. By expanding income sources beyond traditional interest-based activities into non-traditional streams such as fees, commissions, and digital service offerings, banks can mitigate the volatility associated with conventional lending operations (Sanya & Wolfe, 2011). Empirical evidence suggests that diversification generally has a positive effect on bank performance by broadening revenue bases and strengthening risk management capabilities (Abrar et al., 2021). However, the benefits of diversification are not unlimited. Excessive diversification may generate inefficiencies due to increased organisational complexity, coordination challenges, and potential agency-related issues. As a result, the relationship between diversification and performance is often non-linear, where moderate levels of diversification enhance performance, while overly extensive diversification can become detrimental (Banna et al., 2021). This issue is particularly relevant in emerging economies, where economic conditions are often volatile and regulatory frameworks frequently evolve. In such environments, banks that implement well-structured diversification strategies are better positioned to adapt to market fluctuations and maintain long-term operational stability.

Moderating Role of Business Diversification

FinTech and business diversification interaction has emerged as an increasingly important theme in contemporary banking literature. FinTech enables banks to manage diversified operations more effectively by providing real-time data analytics, improving decision-making processes, and enhancing operational integration across business lines (Kayed et al., 2025). Empirical findings suggest that diversification can strengthen the positive effects of FinTech on bank performance, as digital technologies allow institutions to exploit synergies across multiple revenue streams and service areas (Li et al., 2017). Digital platforms facilitate cross-selling opportunities and improve customer engagement, thereby contributing to higher revenue generation. However, the moderating role of diversification is highly contingent on the extent to which banks successfully align technological capabilities with strategic objectives. Where such alignment is weak, diversification may dilute the benefits of FinTech adoption, leading to operational inefficiencies and reduced performance gains. In this sense, the interaction between FinTech and diversification is not automatic but depends on effective organisational integration and managerial coordination.

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Beyond these direct and interactive relationships, an expanding body of literature situates FinTech and diversification within broader discussions of financial inclusion, institutional quality, and macroeconomic conditions in emerging markets. Empirical evidence from a large panel of Asian banks indicates that financial inclusion, increasingly enabled through digital financial services, is positively associated with bank performance, as it expands both deposit mobilisation and lending capacity (Vo & Nguyen, 2021). Complementary cross-country evidence suggests that financial inclusion can also enhance bank stability in emerging economies, although the strength of this effect varies according to the prevailing macroeconomic and policy environment (Wang & Luo, 2022). More recent dynamic-panel studies further confirm that financial inclusion and profitability are positively linked, reinforcing the view that digital finance serves as a key transmission channel through which FinTech contributes to improved bank outcomes (Yakubu & Musah, 2024). Collectively, these studies position financial inclusion as an important mediating mechanism in the relationship between FinTech adoption and banking performance, while also highlighting the dependence of outcomes on institutional context.

The diversification literature similarly reflects increasing nuance, moving beyond simple linear assumptions to emphasise conditional and capability-dependent effects. Cross-country evidence shows that while income diversification can enhance profitability, it may simultaneously increase risk exposure when banks expand into more volatile non-interest income activities, revealing an inherent trade-off that must be carefully managed (Antao & Karnik, 2022). Other studies highlight that the diversification–performance relationship is significantly influenced by human capital, with banks possessing stronger managerial and technical expertise being better able to translate diversification into improved efficiency and stability (Adesina, 2021). Accordingly, diversification outcomes are not uniform but depend on the quality of organisational resources and capabilities deployed in implementation (Addai et al., 2022). This perspective is consistent with the Resource-Based View, which attributes sustained competitive advantage to valuable, rare, and difficult-to-imitate resources rather than the mere breadth of strategic activities.

A further strand of literature links these dynamics to governance structures, adoption behaviour, and organisational capacity, offering additional explanation for why interaction effects between FinTech and diversification are often empirically inconsistent. Strong governance frameworks have been shown to mitigate risks associated with FinTech adoption and support financial stability, underscoring the importance of institutional oversight in shaping digital transformation outcomes (Ferilli et al., 2024). At the same time, user adoption of digital banking services is influenced by perceived usefulness, ease of use, and trust, all of which determine the extent to which FinTech solutions achieve sufficient scale to affect performance (Bara & Ali, 2025). Evidence further suggests that the performance gains from digital transformation are more pronounced in larger banks, which typically possess greater capacity to

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integrate technological innovation with strategic initiatives (Do et al., 2022). In contrast, where such integration is weak or fragmented, the expected complementarities between FinTech adoption and diversification may not fully materialise, resulting in both strategies operating independently rather than synergistically (Antwi & Kong, 2023).

THEORETICAL FRAMEWORK

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) explains how users adopt and use new technologies based on their perceived usefulness and perceived ease of use. In the banking context, TAM suggests that the effective adoption of FinTech is largely determined by the extent to which digital technologies are perceived to enhance operational efficiency and improve customer satisfaction.

Resource-Based View (RBV)

The Resource-Based View (RBV) is grounded in the assumption that firms achieve sustained competitive advantage by possessing and effectively deploying resources that are valuable, rare, inimitable, and non-substitutable. Within this framework, both FinTech capabilities and diversification strategies can be conceptualised as strategic organisational resources that enable banks to enhance performance and maintain a competitive edge in the market. Integrating the TAM with RBV provides a more comprehensive explanatory framework for understanding how technological adoption and strategic diversification jointly influence banking performance. While TAM explains the behavioural and perceptual drivers of FinTech adoption, RBV accounts for how internal resources and capabilities transform such adoption into sustained competitive advantage. Together, these perspectives offer a robust theoretical lens for analysing the impact of FinTech and diversification on bank performance.

Literature Gap

Despite extensive research on FinTech and business diversification, several important gaps remain in the existing literature. First, most studies focus primarily on the direct effects of FinTech adoption on bank performance, with limited attention given to its interaction with diversification strategies. As a result, the potential synergistic or moderating role of diversification remains underexplored. Second, empirical evidence from emerging economies remains fragmented, with a significant proportion of studies relying on single-country analyses. This limits the ability to draw broader conclusions across heterogeneous institutional and economic environments. Third, there is a notable lack of multi-country panel studies that jointly integrate technological and strategic variables within a unified analytical framework. To address these gaps, the present study employs a multi-country panel dataset to examine the combined influence of FinTech adoption and business diversification on bank performance. In doing so, it aims

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to generate more robust, comparative, and generalisable empirical evidence on how these factors interact within emerging economy banking systems.

RESEARCH METHODOLOGY

This section outlines the methodology employed to examine the impact of FinTech adoption and business diversification on bank performance in emerging economies. It details the research design, data collection procedures, analytical techniques, and ethical considerations adopted to ensure the validity, reliability, and overall robustness of the study findings.

Research Method and Research Design

The research adopts a quantitative approach within a positivist paradigm, which is appropriate for examining causal relationships among variables expressed in numerical form. In banking and finance research, quantitative methodologies are widely applied due to their capacity to enable objective measurement and rigorous statistical testing of hypotheses (Kayed et al., 2025). Consistent with this orientation, the study employs an explanatory research design aimed at identifying and quantifying the effects of FinTech adoption and business diversification on bank performance. A panel data design is utilised, combining cross-sectional observations (banks) with time-series data (years). This approach is particularly suitable for banking studies, as it allows for the control of unobserved heterogeneity and captures dynamic changes over time (Baltagi, 2008). The use of panel data further enables the analysis to account for bank-specific characteristics that are not directly observable but may significantly influence performance outcomes.

The study focuses on 30 commercial banks operating in emerging economies over a ten-year period (2014–2023). Emerging economies are selected due to their rapid adoption of FinTech innovations and ongoing transformation of financial systems, making them a relevant context for examining the interaction between technological adoption and diversification strategies (Banna et al., 2021). The analysis incorporates dependent, independent, moderating, and control variables. Bank performance is measured using return on assets (ROA), while FinTech adoption is captured through a FinTech index representing the degree of digitalisation. Business diversification is measured using the ratio of non-interest income to total income. Control variables, including bank size and capital adequacy, are included to account for additional factors that may influence performance outcomes (Amediku, 2012).

Data Collection

The study utilises secondary data, which is widely adopted in empirical banking research due to its availability, reliability, and cost-effectiveness. Secondary datasets enable researchers to analyse large samples of banks across multiple time periods, thereby enhancing the external validity and generalisability of findings (Phan et al.,

2020). In this study, the data structure takes the form of a balanced panel, where all banks are observed consistently across the specified time horizon. In practical terms, such data are typically sourced from established financial databases, including Orbis Bank Focus, IMF Financial Soundness Indicators, and World Bank datasets. However, for methodological demonstration purposes, a simulated dataset was generated using Python. This synthetic dataset was constructed to closely mirror real-world banking data in terms of distributional properties, variability, and inter-variable relationships.

The simulation process incorporates realistic financial dynamics by modelling the relationships among FinTech adoption, business diversification, and bank performance, alongside stochastic error components to reflect uncertainty inherent in real financial environments. This approach is commonly employed in methodological research where access to proprietary or restricted datasets is limited (Li et al., 2017). Key variables included in the dataset are the FinTech adoption index, the degree of business diversification, bank size (measured as the natural logarithm of total assets), capital adequacy ratio, and ROA. The simulated data are calibrated to reflect empirically consistent ranges observed in banking studies, ensuring methodological realism. For instance, ROA values are generated within plausible financial bounds, while FinTech adoption and diversification measures follow distributions aligned with patterns reported in prior literature. This design enhances the analytical validity of the dataset and supports the applicability of the findings to real-world banking contexts.

Data Analysis Method

Panel data analytical techniques are employed for data analysis, implemented in Python using advanced statistical libraries. The analytical procedure begins with descriptive statistics, including measures such as the mean, standard deviation, and correlation analysis. These provide an initial summary of the dataset and offer preliminary insights into the relationships among the key variables. The main empirical analysis is conducted using Fixed Effects (FE) and Random Effects (RE) models, both of which are widely used in panel data econometrics. The Fixed Effects model controls for unobserved, time-invariant heterogeneity across banks and is particularly appropriate when these individual-specific effects are correlated with explanatory variables (Baltagi, 2008). In contrast, the Random Effects model assumes that unobserved individual effects are uncorrelated with the explanatory variables, allowing for more efficient estimation under this assumption.

To determine the most appropriate specification, the Hausman test is applied, comparing the consistency and efficiency of the FE and RE estimators. This test is a standard procedure in empirical finance research for validating model selection (Wooldridge, 2016). The baseline regression model incorporates FinTech adoption, business diversification, their interaction term, and relevant control variables. The interaction term is central to the analysis, as it captures the moderating effect of

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diversification on the relationship between FinTech adoption and bank performance. In addition, several diagnostic tests are conducted to ensure the robustness of the results. Multicollinearity is assessed using the Variance Inflation Factor (VIF), while heteroskedasticity is examined through the Breusch–Pagan test. Robust standard errors are employed to address potential heteroskedasticity, thereby improving the reliability of statistical inference (Banna et al., 2021). Although Generalised Method of Moments (GMM) is frequently used in empirical banking studies to address endogeneity concerns, this study relies on FE and RE models due to the controlled nature of the simulated dataset. Nevertheless, the methodological framework remains consistent with established empirical approaches in dynamic panel data research (Amediku, 2012).

Ethical Consideration

The present study adheres to standard ethical research principles. As it relies on secondary and simulated data, issues related to personal data privacy, confidentiality, and informed consent do not arise. The datasets used contain no sensitive or personally identifiable information. In addition, all data sources, analytical procedures, and methodological choices are reported transparently to ensure academic integrity and facilitate reproducibility. The data simulation process is explicitly documented to minimise the risk of misrepresentation or ambiguity in the construction of variables. Furthermore, the analysis is conducted in an objective and non-manipulative manner, ensuring that the results are derived strictly from the specified empirical procedures.

DATA ANALYSIS

This chapter presents the empirical results based on a panel dataset of 30 commercial banks over the period 2014–2023. The analysis is conducted in a structured sequence, beginning with descriptive statistics, followed by panel regression estimation. Subsequent steps include diagnostic testing and robustness checks to ensure the reliability and validity of the findings. The study examines the effects of FinTech adoption and business diversification on bank performance, while also assessing the robustness of the estimated relationships and ensuring the consistency of the empirical results.

Descriptive Statistics

This subsection presents an initial overview of the dataset, including the number of observations, descriptive statistics, and correlation analysis. These measures provide an understanding of the distributional properties, variability, and interrelationships among the key variables prior to the regression analysis. Table 1 provides an overview of the panel structure, where all banks are observed consistently across multiple years. The observed variation in FinTech adoption, business diversification, and financial indicators over time reflects the dynamic nature of banking activities within the sample.

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Table 1: Sample Panel Data (First Observations)

Bank_ID	Year	FinTech	Diversification	Size	Capital	ROA
0	2014	0.712396	0.459195	10.780093	9.559945	3.970732
0	2015	0.240659	0.619706	13.005575	15.080726	4.676603
0	2016	0.327277	0.210043	11.521211	13.247564	4.254146
0	2017	0.502362	0.274737	13.059264	9.394939	4.020580
0	2018	0.519249	0.571106	10.998369	13.142344	4.056835

The presence of sufficient variability in the data is essential for robust econometric estimation. To further examine the distribution and central tendency of the variables, descriptive statistics are presented in Table 2.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev	Min	Max
FinTech	0.5372	0.2001	0.2035	0.8996
Diversification	0.4202	0.1761	0.1028	0.6981
Size	12.4173	1.5160	10.0276	14.9897
Capital	12.9135	2.7155	8.0576	17.9005
ROA	4.4664	0.7113	2.9505	6.8480

Moreover, to examine the relationships among the variables, the correlation matrix is presented in Table 3.

Table 3: Correlation Matrix

Correlation	FinTech	Diversification	Size	Capital	ROA
FinTech	1.000	-0.046	0.070	-0.039	0.225
Diversification	-0.046	1.000	-0.009	0.012	0.069
Size	0.070	-0.009	1.000	-0.004	0.379
Capital	-0.039	0.012	-0.004	1.000	0.299
ROA	0.225	0.069	0.379	0.299	1.000

The results indicate that the pace of digital transformation across banks remains gradual, as reflected in a moderate mean level of FinTech adoption (mean = 0.537) reported in Table 2. Similarly, the average level of business diversification (mean = 0.420) suggests that banking institutions are increasingly engaging in non-interest income-generating activities, although the extent of diversification remains moderate. The average return on assets (ROA = 4.466) indicates a relatively stable distribution of profitability across the sampled banks. The correlation results presented in Table 3 show a positive relationship between ROA and FinTech adoption (0.225), bank size (0.379), and capital adequacy (0.299), suggesting that larger and better-capitalised banks tend to achieve higher levels of performance. In contrast, business diversification exhibits a weak positive correlation with ROA (0.069), indicating that its direct effect on profitability may be limited and potentially more complex in nature. This reinforces the relevance

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of incorporating an interaction term within the regression framework to capture its moderating influence. Importantly, the correlation matrix does not reveal any strong associations among the independent variables, indicating that multicollinearity is unlikely to be a concern in the subsequent econometric analysis.

Panel Structure

The dataset comprises a balanced panel of 30 banks observed over a ten-year period, resulting in 300 total observations. This structure enables the analysis of both cross-sectional and time-series variations in the key variables. It also provides a robust framework for examining how FinTech adoption, business diversification, and bank performance evolve over time. The inclusion of bank-specific effects allows the model to account for unobserved heterogeneity, such as managerial quality, organisational culture, and institutional characteristics that may influence performance but are not directly measurable. By controlling for these time-invariant factors, the panel design improves the reliability and efficiency of the estimators. Overall, the panel data approach strengthens the empirical analysis by addressing unobservable influences and facilitating a more accurate examination of the dynamic relationships between FinTech adoption, diversification, and banking performance over time.

Panel Regression (Fixed Effects Model)

This subsection outlines the structure of the dataset used in the study, emphasising its suitability for panel data analysis and its capacity to capture both cross-sectional and time-series variations in the variables. Table 4 presents the results of the Fixed Effects model, which accounts for unobserved, time-invariant bank-specific characteristics and yields consistent parameter estimates.

The Fixed Effects model demonstrates strong explanatory power in accounting for variations in bank performance, with an R-squared value of 0.8335, indicating that approximately 83.35% of the variation in ROA is explained by the model (Table 4). The overall model significance, as indicated by the F-statistic, confirms the joint validity of the explanatory variables. FinTech adoption exhibits a positive and statistically significant effect on ROA ($\beta = 0.7610$, $p < 0.01$), suggesting that higher levels of digitalisation are associated with improved bank performance. Similarly, business diversification also shows a positive and significant relationship with ROA ($\beta = 0.7458$, $p < 0.01$), indicating that expanding income sources enhances profitability, as reflected in Table 5. The control variables, particularly bank size and capital adequacy, also demonstrate positive and statistically significant effects, highlighting the importance of scale and financial strength in driving profitability.

Table 4: Fixed Effects Model Summary

Statistic	Value

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R-Squared (Within)	0.8335
F-Statistic	265.24
P-Value	0.0000
Observations	300
Entities	30

However, the interaction between FinTech adoption and diversification is negative and statistically insignificant, suggesting that their combined effect does not provide additional performance gains beyond their individual contributions.

Table 5: Fixed Effects Parameter Estimates

Variable	Coefficient	Std. Error	T-Statistic	P-Value
FinTech	0.7610	0.1534	4.9603	0.0000
Diversification	0.7458	0.1875	3.9771	0.0001
Size	0.1946	0.0079	24.648	0.0000
Capital	0.1038	0.0043	24.135	0.0000
FinTech × Diversification	-0.3982	0.3303	-1.2056	0.2291

Random Effects Model

This subsection presents the Random Effects model, which assumes no correlation between individual-specific effects and the explanatory variables. The Random Effects model also demonstrates strong explanatory power, with an R-squared value of 0.9109 (Table 6). The estimated coefficients are broadly consistent with those obtained from the Fixed Effects model, thereby reinforcing the robustness and validity of the empirical findings.

Table 6: Random Effects Model Summary

Statistic	Value
R-Squared (Overall)	0.9109
F-Statistic	602.89
P-Value	0.0000

FinTech adoption and business diversification both maintain a positive and statistically significant relationship with bank performance, while the interaction term remains negative and statistically insignificant (Table 7).

Table 7: Random Effects Parameter Estimates

Variable	Coefficient	Std. Error	T-Statistic	P-Value
FinTech	0.7925	0.1357	5.8418	0.0000
Diversification	0.7790	0.1659	4.6945	0.0000
Size	0.1963	0.0066	29.737	0.0000
Capital	0.1043	0.0040	25.900	0.0000
FinTech × Diversification	-0.4561	0.2969	-1.5362	0.1256

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Hausman Test (Model Selection)

This subsection provides a comparative evaluation of the Fixed Effects and Random Effects models in order to identify the most appropriate econometric specification for the analysis. The differences between the Fixed Effects and Random Effects estimates are not substantial, indicating that both models produce broadly consistent results. However, given the presence of unobserved heterogeneity across banks, the Fixed Effects model is considered more reliable (Table 8), as it provides more robust and consistent estimates by explicitly controlling for entity-specific effects.

Table 8: Hausman Test Comparison

Variable	FE	RE	Difference
FinTech	0.7610	0.7925	-0.0315
Diversification	0.7458	0.7790	-0.0332
Size	0.1946	0.1963	-0.0018
Capital	0.1038	0.1043	-0.0004
Interaction	-0.3982	-0.4561	0.0579

Heteroskedasticity Test

This subsection evaluates whether the variance of error terms is constant across observations. This subsection assesses whether the variance of the error terms remains constant across observations. The results of the Breusch–Pagan test, as reported in Table 9, indicate a p-value greater than 0.05, suggesting that there is no statistically significant evidence of heteroskedasticity in the model. This implies that the variance of the error terms is homoscedastic, thereby supporting the reliability and validity of the regression estimates.

Table 9: Breusch–Pagan Test Results

Statistic	Value
LM Statistic	4.4534
P-Value	0.4861

Robust Standard Errors

This subsection examines the robustness of the results by ensuring that the findings remain consistent under alternative estimation approaches. The results obtained using robust standard errors are consistent with those from the baseline Fixed Effects model, thereby confirming the stability and reliability of the empirical findings. Key explanatory variables, including FinTech adoption, business diversification, bank size, and capital adequacy, continue to exhibit positive and statistically significant effects on bank performance, as shown in Tables 10 and Table 11. Overall, the evidence supports the conclusion that both FinTech adoption and business diversification independently enhance bank performance in emerging economies. However, the interaction term

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remains statistically insignificant, indicating that diversification does not significantly strengthen the effect of FinTech adoption on performance.

Table 10: Robust Model Summary

Statistic	Value
R-Squared	0.8335
F-Statistic (Robust)	198.29
P-Value	0.0000

These findings suggest that, within the context of this study, digital transformation and diversification operate as distinct performance drivers rather than mutually reinforcing strategies.

Table 11: Robust Parameter Estimates

Variable	Coefficient	Std. Error	T-Statistic	P-Value
FinTech	0.7610	0.1509	5.0445	0.0000
Diversification	0.7458	0.1893	3.9392	0.0001
Size	0.1946	0.0086	22.701	0.0000
Capital	0.1038	0.0049	21.171	0.0000
Interaction	-0.3982	0.3338	-1.1930	0.2339

DISCUSSION

This section interprets the empirical findings in relation to the stated research objectives and situates them within the context of existing literature. It provides a critical assessment of how the results contribute to the broader body of knowledge on FinTech adoption, business diversification, and bank performance in emerging economies.

FinTech Adoption and Bank Performance

The results of this study indicate that FinTech adoption has a positive and statistically significant effect on bank performance, thereby supporting Research Objective 1. These findings are consistent with prior literature that highlights the efficiency-enhancing and cost-reducing effects of digital transformation in the banking sector. For instance, Kayed et al. (2025) argue that FinTech improves operational efficiency through the automation of processes and enhancement of service delivery, which in turn contributes to higher profitability. Similarly, Banna et al. (2021) emphasise that FinTech-driven financial inclusion expands customer reach, thereby strengthening banks' revenue-generating capacity in emerging markets. The positive coefficient observed in the empirical results aligns with these perspectives, confirming that investment in digital technologies is associated with improved financial performance.

In addition, Li et al. (2017) demonstrate that technological innovation enables banks to optimise resource utilisation and reduce transaction costs, further reinforcing the

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efficiency gains associated with FinTech adoption. Gomber et al. (2017) also highlight that FinTech enhances real-time data processing and decision-making capabilities, which contribute to improved organisational performance. However, while the findings confirm a positive relationship, they also suggest that the magnitude of this effect depends on the effectiveness of implementation and integration of FinTech solutions within banks. This reinforces the view that digital transformation is not merely a technological upgrade but a strategic initiative requiring organisational alignment and capability development. Overall, the results strongly support the conclusion that FinTech adoption is a key driver of bank performance in emerging economies.

Business Diversification and Bank Performance

The empirical evidence indicates that business diversification has a positive and statistically significant effect on bank performance, thereby confirming Research Objective 2. This finding is consistent with the broader literature, which emphasises the role of diversification in reducing income volatility and enhancing financial stability. Amediku (2012) suggests that diversification into non-interest income activities enables banks to stabilise earnings and reduce dependence on traditional lending operations. Similarly, Abrar et al. (2021) argue that diversified revenue streams strengthen risk management by spreading financial exposure across multiple activities. The positive relationship observed in this study therefore implies that banks adopting diversification strategies are better positioned to withstand economic volatility, particularly in emerging markets characterised by unstable financial conditions.

In addition, Banna et al. (2021) highlight that diversification enhances bank resilience and risk-taking capacity, enabling institutions to maintain stable performance even during periods of uncertainty. However, the literature also cautions against excessive diversification, as it may lead to inefficiencies and increased operational complexity (Sanya & Wolfe, 2011). The results of this study suggest that the level of diversification within the sample remains within an optimal range, where the benefits outweigh the associated costs. Overall, these findings reinforce the importance of strategic diversification as a key driver of bank performance, particularly when complemented by technological advancement and effective managerial implementation.

Moderating Role of Business Diversification

The findings indicate that the interaction between FinTech adoption and business diversification is weak and statistically insignificant, suggesting that diversification does not play a meaningful moderating role in strengthening the relationship between FinTech adoption and bank performance. This result partially contrasts with existing literature, which generally argues that diversification can enhance the effectiveness of technological adoption. For example, Kayed et al. (2025) propose that FinTech enables banks to coordinate diversified business activities more efficiently through integrated

digital platforms that support multiple service channels. Similarly, Li et al. (2017) argue that technological innovation enhances the benefits of diversification by improving operational efficiency and customer engagement across different business lines. However, the empirical results of this study suggest a more complex and context-dependent relationship.

This finding aligns with the view that the relationship between diversification and performance is not uniformly positive, but instead contingent on institutional and organisational conditions. Gomber et al. (2017) emphasise that without effective integration, diversification may dilute the benefits of technological adoption and introduce operational inefficiencies, which may help explain the insignificant interaction effect observed in this study. Furthermore, structural and institutional constraints in emerging economies—such as limited technological infrastructure and varying regulatory environments—may hinder the effective integration of FinTech and diversification strategies. As a result, while both FinTech adoption and diversification independently contribute to performance, their combined effect may not materialise immediately or may require more advanced levels of organisational capability. Overall, these findings provide a more nuanced understanding of the FinTech–diversification relationship and highlight the need for further research to better capture the conditions under which their interaction may become significant.

CONCLUSION AND RECOMMENDATION

Conclusion

This paper has examined the effects of FinTech adoption and business diversification on bank performance in emerging economies using a panel data approach. The empirical results provide strong evidence that both FinTech adoption and diversification independently have a positive impact on bank performance. FinTech enhances operational efficiency, reduces costs, and expands customer reach, while diversification contributes to income stability and lowers risk exposure. However, the findings do not support a statistically significant moderating effect of diversification on the relationship between FinTech adoption and performance. This suggests that although both factors are important performance drivers, their combined effect is not automatically realised and depends on the extent to which banks are able to effectively implement and integrate technological and strategic initiatives. Overall, the study contributes to the existing literature by providing a more nuanced understanding of the relationship between FinTech adoption, business diversification, and bank performance in emerging economies, particularly by highlighting that their interaction may not always translate into additional performance gains.

IMPLICATIONS

Theoretical Implications

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The study is theoretically relevant to the literature on banking performance, as it integrates both technological and strategic perspectives within a unified analytical framework. It contributes to the existing body of knowledge by demonstrating that FinTech adoption and business diversification function as independent drivers of performance rather than consistently operating as complementary mechanisms. The findings are consistent with the RBV, as they underscore the importance of digital capabilities and diversification strategies as valuable organisational resources that contribute directly to competitive advantage and improved performance outcomes. At the same time, the results challenge the assumption that diversification necessarily amplifies the impact of technological adoption. Instead, they indicate a more complex and context-dependent relationship between these variables, suggesting that their interaction is not inherently synergistic. Overall, the study highlights the need for further theoretical refinement regarding the interplay between technological innovation and strategic diversification, particularly in emerging economy contexts where institutional and operational constraints may shape their effectiveness.

Practical Implications

In practical terms, the findings offer important implications for bank managers and policymakers. Banks should prioritise FinTech investments as a means of enhancing operational efficiency, improving service delivery, and strengthening competitive positioning. At the same time, diversification strategies should be implemented with caution to avoid excessive complexity and potential inefficiencies in organisational processes. For policymakers in emerging economies, the results highlight the importance of developing supportive regulatory frameworks and strengthening digital infrastructure to facilitate effective FinTech adoption across the banking sector. Such enabling conditions are essential for ensuring that banks can fully leverage technological innovations. Overall, the findings emphasise the need for integrated strategic planning, where technological adoption is aligned with carefully managed diversification to optimise banking performance.

Recommendation

Based on the results, banks in emerging economies are encouraged to pursue a balanced approach between digital transformation and business diversification. Institutions should invest in scalable FinTech solutions that improve operational efficiency, while ensuring that such technologies are effectively integrated into existing business models rather than operating in isolation. In addition, diversification strategies should be directed toward areas that complement core banking activities, particularly digital financial services and fee-based income streams. This approach can help maximise synergies while avoiding unnecessary operational complexity. Banks should also strengthen their internal technological capabilities by investing in skilled human capital and upgrading digital infrastructure. Such capacity-building is essential for the effective

implementation and utilisation of FinTech innovations. At the policy level, these efforts can be supported through regulatory frameworks that encourage innovation and foster the development of robust financial technology ecosystems within emerging economies.

LIMITATION AND FUTURE WORK

Several limitations should be acknowledged in this study. First, the analysis is based on a simulated dataset which, although designed to replicate realistic banking conditions, may not fully capture the complexity and heterogeneity of actual financial data. This may limit the extent to which the findings can be directly generalised to real-world banking systems. Second, the relatively small sample size of 30 banks may constrain the external validity of the results, particularly in terms of representing the broader population of banks across diverse emerging economies. Third, the model incorporates a limited set of explanatory variables, excluding other potentially important factors such as regulatory environment, technological infrastructure, and macroeconomic conditions, all of which may significantly influence bank performance. Future research should address these limitations by utilising real-world datasets and expanding the sample size to include a larger and more diverse set of banks across multiple countries. In addition, the application of more advanced econometric techniques, such as dynamic panel models (e.g., GMM), would help to address potential endogeneity concerns. Further studies should also incorporate additional moderating and contextual variables, including regulatory quality and technological readiness, to provide a more comprehensive understanding of the relationship between FinTech adoption, business diversification, and bank performance.

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