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Analyzing the credit risk, liquidity, and performance of diversified banking firms listed on the Indonesia Stock Exchange

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ABSTRACT

The research investigates the factors that influence investment diversification in conventional banks in Indonesia, with a particular emphasis on liquidity risk, credit risk, profitability, inflation, GDP, bank size, interbank ratios, capitalization, and board governance characteristics. Investment strategies and risk management were examined using data from the Indonesian banking sector and subsequently, the empirical findings based on the application of Ordinary Least Squares (OLS) will be presented. The findings indicated that investment concentration is being driven by liquidity risk, while diversification is being discouraged by credit risk. Diversification is positively influenced by profitability, while inflation has a negative impact on it. Diversified strategies are more effectively implemented by institutions that are larger and more adequately capitalized. The direct impact of board diversity on diversification is limited by the broader governance structures. The findings indicate that liquidity risk drives investment concentration, as banks prioritize liquid assets during periods of heightened risk. Similarly, credit risk discourages diversification, pushing banks to focus on safer, familiar investments. Conversely, profitability positively influences diversification, enabling banks to allocate resources toward balanced and diverse portfolios. Inflation negatively affects diversification by increasing investment concentration, while GDP shows no significant impact, contradicting previous studies. Larger and well-capitalized banks are better equipped to pursue diversified strategies, while interbank ratios exhibit no significant influence. Board diversity, though widely regarded as a factor in decision-making, shows limited direct impact on diversification, likely due to broader governance structures. To enhance financial stability, policymakers should concentrate on the following: managing liquidity and credit risks, maintaining stable inflation, strengthening governance, empowering smaller banks, encouraging innovative financial products, and investigating governance-diversification links.

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INTRODUCTION

The banking sector is sensitive to both national and international macroeconomic trends; in 2024, the IMF predicts a worldwide economic growth rate of 3.1%. The financial company industry is expected to have a bright outlook, contributing to Indonesia's predicted 5% economic expansion (World Bank, 2024). Conventional banks and other members of the banking sector play an essential role in peripheral economies by ensuring the stability of the financial system and fostering economic growth (Allen et al., 2019).

Managing credit risk and liquidity concerns efficiently is crucial for maintaining stability in the banking industry and the wider financial system. The finance sector is vital for a country's economic success. Minimizing credit risk and liquidity risk is one way to evaluate a conventional bank's capabilities. Bank default can be caused by credit risk. Bank size, liquidity, capital, rivals, credit derivatives, corporate governance, debtor morale, and other microeconomic factors are the sources of credit risk. Prices of goods and services, the unemployment rate, interest rates, credit, business cycles, and real estate all reflect macroeconomic issues. Canh et al. (2021) emphasize the importance of policymakers analyzing macroeconomic conditions in order to prevent financial crises. In contrast, traditional contracts seek financing in order to cover the promised credit. Non-Performing Loan (NPL) ratio size is a measure of credit risk losses for traditional banks (Haris et al., 2024).

Due to the diversification and rapid expansion of bank business activities, the conventional banking industry in Indonesia is currently facing an increasing number of complex hazards (Khattak et al., 2021) Therefore, it is the responsibility of banks to mitigate these risks. The new capital concept of risk-based capital adequacy mandates that risk management follow the worldwide criteria set by the Bank for International Settlements (BIS). According to Suhardono et al. (2023)., banks have also restructured their risks in order to keep their short-term liquidity stable for both themselves and their borrowers.

From 2020 onwards, and especially during the COVID-19 epidemic, Indonesia's nonperforming loan (NPL) ratio at conventional banks tends to rise (Otoritas Jasa Keuangan (OJK), 2024). With a reasonably steady Loan-to-Deposit Ratio (LDR) and a history of consistent increases in lending, Indonesia's banking and financial services sector has shown resilient throughout the years, according to Financial Stability Review (FSR) (2022). Yet, the banking system has been greatly impacted by the rise in non-performing loans (Ari et al., 2019). The biggest Indonesian bank, Bank Mandiri, has seen an increase in nonperforming loan ratios (NPLs) due to the widespread effects of the COVID-19 pandemic (The Banker (2021); Asia News Network (2021). The percentage of non-performing loans (NPLs) in the banking sector has risen by 2024, with gross NPLs reaching 2.35% and net NPLs reaching 0.79% (Otoritas Jasa Keuangan (OJK), 2024).

A captivating alternative to conventional banking operations is the concept of investment diversification. Nowadays, the majority of banks utilize asset management firms to allocate their funds to companies that are predominantly stable, as per (McKinsey, 2024). (Deloitte Insights, 2024) aims to increase the magnitude and quality of these investments within a certain time frame. Mutual funds, VC funds, private equity, and bonds may also be utilized as investments of this nature.

The main objective of this research is to examine the relationship between performance, risk, and diversification in different financial distress situations. The purpose is to discover the factors that affect banking diversity, encompassing both general and bank-specific elements. This inquiry offers some innovative insights into the banking system, enhancing the current body of

information. This study examines the effects of financial distress on the relationship among performance, liquidity, credit risk, and investment diversification in traditional banks.

RESEARCH METHOD

Banking organizations that are included in the S&P 100 comprise the research population. Financial ratios from population finance reports from the 2013-2023 period comprise the sample data. Purposive sampling is employed to determine the most suitable sampling technique, with the depth and relevance of the sample being significantly impacted by its selection. (1) Consistent registration of conventional banking from 2013 to 2023, (2) No delisting during this time, and (3) Financial reports that are detailed and in accordance with the research's variable data requirements. Purposive sampling was implemented to acquire research data, which consisted of 36 observations. The empirical results that were obtained through the application of Ordinary Least Square (OLS) will be presented subsequent to this.

Table 1. Measurement of Variables

Type of Variable	Variable	Symbol	Indicator	Reference
Dependent	Non-Interest Income	NONII	$\frac{Non\ Interest\ Income}{Net\ Operating\ Income}$	(Craigwell & Maxwell, 2006)
Dependent	The Herfindahl-Hirschmann Index	HHI	$\left[\frac{Non\ Interest\ Income}{Net\ Operating\ Income}\right]^2 + \left[\frac{Net\ Interest\ Income}{Net\ Operating\ Income}\right]^2$	(Karkowska, 2019)
Independent	Credit Risk	LLP	$\frac{Loans\ Loss\ Provisions}{Loans}$	(Ngoc Nguyen, 2019)
Independent	Liquidity Risk	LTA	$\frac{Net\ Loans}{Total\ Assets\ Ratio}$	(Gafrej & Boujelbéne, 2022)
Independent	Profitability	ROA	$\frac{Net\ Income}{Average\ Total\ Assets}$	(Ngoc Nguyen, 2019)
Independent	Inflation Rate	INF	$Annual\ percentage\ rate\ of\ inflation$	(Fisher, 1930)
Independent	Gross Domestic Product	GDP	$Growth\ rate\ of\ GDP\ in\ percentage$	(AlKhouri & Arouri, 2019)
Independent	Bank Size	SIZE	$Natural\ logarithm\ of\ total\ assets$	(Nachum, 2014; Tallman & Li, 1996)
Independent	Interbank Ratio	IBR	$Loans\ receivable\ from\ banks\ against\ de$	(Karkowska, 2019)
Independent	Capitalization Ratio	CAP	$Capital\ to\ total\ assets\ ratio$	(Ghenimi & Chaibi, 2002)
Independent	Director Boards	BS CEOD EXD FORD GD	$BS = The\ quantity\ of\ directors$ $CEOD = 1\ if\ CEO = chairman, 0 = otherwise$ $EXD = The\ ratio\ of\ executive\ directors$ $FORD = The\ ratio\ of\ foreign\ directors$ $GD = The\ women\ ratio$	(Adams & Ferreira, 2009; Carter et al., 2003)

RESULTS AND DISCUSSIONS

The author utilizes Eviews to examine the data in this study. This study utilizes descriptive statistics, normality assessments, multicollinearity evaluations, autocorrelation analyses, heteroscedasticity examinations, and panel regression models for data analysis.

Data Analysis Results

Descriptive Statistical Analysis

Table 2. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
NONII	396	-20.963	48.354	-0.407	2.897
HHI	396	0.205	65,842.030	393.026	3,522.403
LTA	396	0.103	0.807	0.602	0.110
ROA	396	-0.136	0.053	0.006	0.021
LLP	396	0.000	0.484	0.039	0.048
CAP	396	0.022	0.622	0.151	0.082
IBR	396	0.062	158.833	13.798	37.257
SIZE	396	13.395	21.500	17.606	1.798
BS	396	2.000	17.000	6.874	2.832
CEOD	396	0.000	0.000	0.000	0.000
EXD	396	0.167	20.750	5.199272	3.918
FORD	396	0.000	0.545	0.093	0.139
GD	396	0.000	1.000	0.194	0.192
GDP	396	-0.0207	0.056	0.043	0.021
INF	396	0.017	0.084	0.040	0.023

Source: Secondary data processed by the author, 2024

Table 2 presents a descriptive study of the dependent and independent factors for traditional banks in Indonesia. The average Non-Interest Income (NONII) of -0.406623 suggests that these banks may have had losses from non-lending operations, such as fees, trading, and investments. This indicates a failure to adequately diversify revenue streams outside funding sources. The market is intensely competitive, minimally concentrated, and favorable for cost reduction and innovation, as evidenced by an average Herfindahl-Hirschman Index (HHI) of 393.0262. This competitive landscape requires banks to efficiently manage expenses and innovate, while also advancing financial inclusion and consumer advantages.

The mean Loan-to-Asset (LTA) ratio of 0.602461, which indicates that loans account for 60% of bank assets, is indicative of a typical commercial banking emphasis on lending. Nevertheless, a substantial portion of assets are maintained in alternative forms, including cash and securities. This ratio, which is in accordance with global standards for developing economies, demonstrates the sector's contribution to economic stability and development. Nevertheless, the average Return on Assets (ROA) of 0.006052, which is significantly lower than the common range of 1%-1.5%, highlights the potential for inefficiencies or increased operating costs to affect profitability.

In the face of economic uncertainties, conventional banks allocate an average of 3.94% of loans to loan loss provisions, suggesting a cautious approach to risk management. The average ratio of 15.13% is considerably higher than the 8% regulatory requirement under Basel III standards, indicating that capitalization levels are robust. This implies a high degree of financial fortitude. The interbank ratio of 60.67% underscores the significant dependence on interbank lending for liquidity management.

Although they lack the dominance of top-tier institutions, mid-sized banks in Indonesia play a significant role in retail, corporate, and SME markets, with an average size of 17.60650 (log of total assets) and a standard deviation of 1.797432. The governance analysis suggests that the board has a moderate level of diversity, with 9.26% foreign directors, 5.20% executive directors, and 19.45% female representations. Although these figures demonstrate adherence to regulatory diversity guidelines, they are insufficient in comparison to global best practices, particularly in terms of gender balance.

The performance of emerging markets is consistent with the positive development of GDP, as indicated by macroeconomic indicators with an average of 0.043391. There are two periods that

are particularly noteworthy: the robust growth of 2013 (0.055600) as a consequence of favorable external conditions and the contraction in 2020 (-0.0207) caused by the COVID-19 pandemic. The inflation rate of 0.040218 is within the target range of Indonesia. The rate peaked at 0.083800 in 2013 due to supply-side disruptions, and it plummeted to 0.016800 in 2020 due to the pandemic's impact on economic activity and demand.

Panel Data Regression Model

This study used panel data regression analysis to measure the relationship between the dependent and independent variables and to ascertain the overall impact of the independent variables on the dependent variable.

$$NONII = \alpha 0 + \beta 1LTAit + \beta 2ROAit + \beta 3LLPit + \beta 4CAPit + \beta 5IBRit + \beta 6SIZEit + \beta 7BSit + \beta 8EXDit + \beta 9FORDit + \beta 10GDit + \beta 11GDPit + \beta 12INFit + eit \quad (1)$$

$$HHI = \alpha 0 + \gamma 1LTAit + \gamma 2ROAit + \gamma 3LLPit + \gamma 4CAPit + \gamma 5IBRit + \gamma 6SIZEit + \gamma 7BSit + \gamma 8EXDit + \gamma 9FORDit + \gamma 10GDit + \gamma 11GDPit + \gamma 12INFit + eit \quad (2)$$

This research applies panel data regression analysis to test the influence of *credit risk, liquidity risk, profitability, inflation rate, GDP*, *bank size, interbank ratio, capitalization ratio* and *director boards variables* on investment diversification.

Model Determination Test

The aim of this analysis is to determine the degree of correlation between the independent variable and the dependent variable. To be deemed the most effective, the proposed regression model must satisfy the following criteria:

Coefficient of Determination Test assesses the extent to which the independent variable may explain the dependent variable. The Adjusted R-squared (R^2) score is 0.890, equivalent to 89%. This signifies that LTA, ROA, LLP, CAP, IBR, SIZE, BS, EXD, FORD, GD, GDP, and INF account for 89% of the variance in HHI. Conversely, the residual 11% is affected by factors excluded from the regression model. The variables LTA, ROA, LLP, CAP, IBR, SIZE, BS, EXD, FORD, GD, GDP, and INF jointly account for 75.1% of the variation in NONII. The residual 24.9% is ascribed to variables excluded from the regression model.

Hypothesis Test

The effects of credit risk, liquidity risk, profitability, inflation rate, GDP, bank size, interbank ratio, capitalization ratio, and board of directors on investment diversification among conventional banking firms included on the S&P 100 were analyzed via hypothesis testing. If the F significance value is below 0.05, the dependent variable is significantly affected by each independent variable.

Table 3. Panel Data Regression & Hypothesis Test

Variable	NONII			HHI		
	Coefficient	t-Statistic	Probability	Coefficient	t-Statistic	Probability
C	27.629	27.629	0.000**	1.432	4.615	0.000**
LTA	3.208	3.208	0.008**	-0.912	-5.965	0.000**
ROA	33.783	33.783	0.000**	-11.624	-12.704	0.000**
LLP	43.482	43.482	0.000**	0.027	3.076	0.009**
CAP	-7.122	-7.122	0.000**	-0.622	-2.821	0.005**
IBR	1.736	1.736	0.083	-2.16E-08	-1.636	0.102
SIZE	-29.861	-29.861	0.000**	-0.049	-2.558	0.011**
BS	13.166	13.166	0.000**	-0.056	-4.933	0.000**
EXD	0.734	0.734	0.463	0.002	0.441	0.659

FORD	10.273	10.273	0.000**	0.055	0.472	0.000**
GD	14.590	14.590	0.000**	0.049	0.578	0.000**
GDP	-0.641	-0.641	0.522	12.509	13.463	0.101
INF	-4.124	-4.124	0.000**	-10.870	-13.599	0.000**

Note: ** Significant at 5% level

Discussion

a. The Effect of Liquidity Risk on Investment Diversification

The study highlights that the LTA variable positively and significantly affects HHI, while having an inverse impact on NONII. These results align with previous research by Ngoc Nguyen (2019), Ammar & Boughrara (2019), and Gafrej & Boujelbéne (2022), which emphasize that investment diversification can enhance a bank's risk-adjusted returns. Diversified strategies help banks reduce losses from defaults, improving their risk profiles and profitability.

According to Basel III requirements, banks must maintain specific liquidity ratios, such as the Liquidity Coverage Ratio (LCR). During periods of heightened liquidity risk, banks may prioritize liquid or familiar investments, leading to a concentration in certain asset classes or sectors, such as government bonds or other high-quality liquid assets (HQLA). Studies suggest that under such conditions, banks often reduce portfolio diversification to focus on liquid and easily tradable securities, thereby minimizing the risk of illiquidity. Ihrig et al. (2019) also observed that banks in countries with higher liquidity risks tend to concentrate investments in safer, more liquid assets to mitigate exposure to volatility.

Furthermore, the Asset-Liability Management (ALM) Theory suggests that banks manage liquidity risks by aligning the maturity of assets and liabilities. In times of high liquidity risk, banks may adopt a more concentrated portfolio to better control cash flows and reduce complexity. Diversified portfolios can be harder and more costly to manage during market stress, prompting banks to favor a more predictable and controlled approach to liquidity management.

b. The Effect of Credit Risk on Investment Diversification

The LLP variable significantly influences NONII and HHI, contributing positively to both investment diversification (0.027) and HHI (18,068.11). These findings align with research byKarkowska (2019), Gafrej & Boujelbéne (2022), and Ngoc Nguyen (2019)which highlight that liquidity risk negatively affects NONII and that higher credit risk can discourage diversification due to the potential for greater losses.

Credit risk often drives banks toward investment concentration as a strategy to leverage expertise or maintain tighter control. According to Agency Theory, managers may focus on familiar, lower-risk sectors to minimize agency costs associated with unfamiliar or diverse investments. Jensen & Meckling (1976) suggest that concentrating investments in specific asset classes or industries allows managers to better control risks and reduce unpredictability.

Risk Aversion Theory also supports this behavior, as risk-averse banks tend to concentrate on low-risk or well-known sectors to avoid unpredictable losses. For example, they may favor government-backed securities or established corporations with strong credit ratings. Acharya et al. (2006) note that such banks often prioritize concentrated exposure to less risky borrowers over diversified investments in sectors with uncertain credit quality.

c. The Effect of Profitability on Investment Diversification

ROA has a positive and significant impact on HHI, indicating that higher profitability encourages investment diversification. This aligns with studies by Alkhouri & Arouri (2019) and Ammar & Boughrara (2019)which found that diversification enhances risk-adjusted returns and financial performance. Diversified portfolios improve earnings stability and reduce exposure to specific risks, demonstrating that bank profitability positively influences diversification efforts.

Several theories explain this relationship. According to Modern Portfolio Theory (MPT), profitable banks (with higher ROA) are better positioned to pursue less risky, diversified investments across various asset classes, sectors, or geographies. Profitability acts as a buffer against losses, reducing dependency on any single investment or sector and lowering concentration.

Additionally, regulatory frameworks like Basel III encourage banks to maintain adequate capital buffers relative to risk-weighted assets. Profitable banks, with greater retained earnings and access to capital markets, are better equipped to meet these requirements and diversify their portfolios, achieving a balanced risk-return profile while reducing concentration.

Research by Bikker & Hu (2002)and Bank Profitability, (2024) also shows that profitable banks adopt less concentrated investment strategies. Their stronger financial health and advanced risk management enable them to sustain potential losses from diversification without significant adverse effects. Thus, increased profitability empowers banks to diversify more effectively.

d. The Effect of Inflation on Investment Diversification

The INF variable significantly impacts HHI, with inflation contributing to investment concentration. Specifically, the coefficient shows that inflation negatively affects NONII by 10.870 but increases HHI by 3,605.124, suggesting that inflation discourages diversification.

This aligns with Markowitz (1952)'sresearch, which found that inflation reduces real returns on diversified investments, weakening their effectiveness for risk management. Similarly, the Capital Asset Pricing Model (CAPM) by Sharpe (1964)supports this view, as unexpected inflation can lower the market risk premium and reduce expected returns on diversified assets, particularly equities. Thus, inflation tends to drive investment concentration by undermining the benefits of diversification.

e. The Effect of GDP on Investment Diversification

The research findings indicate that GDP has no significant impact on HHI. This contradicts the studies by Amidu & Wolfe (2013)and Herwald et al. (2024), which found that macroeconomic factors, including GDP levels, negatively affect HHI. Their research suggested that economic growth could encourage banks to diversify their portfolios to benefit from expanding opportunities.

f. The Effect of Bank Size on Investment Diversification

The SIZE variable significantly affects NONII, contributing -0.049 to investment diversification and 667.360 to HHI. This supports findings by Ngoc Nguyen (2019)which suggest that larger banks, with greater resources and access to diverse financial products and markets, are better positioned to implement effective investment diversification strategies compared to smaller banks.

g. The Effect of Interbank Ratio on Investment Diversification

The research results show that IBR has no impact on HHI, contradicting previous studies. Merz et al. (2017) suggested that a healthy interbank ratio enhances banks' resilience to financial disruptions, enabling them to adopt more diversified investment strategies. Banks that demonstrated resilience were in a stronger position to maintain diversified operations and continue their lending activities, even amidst periods of economic uncertainty. This ability to navigate challenges effectively, supported by solid capital and liquidity, allowed these banks to uphold their financial functions and diversify investments despite volatile conditions (International, 2020)

h. The Effect of Capitalization Ratio on Investment Diversification

The CAP variable significantly impacts NONII, contributing -0.622 to investment diversification and 1,811.579 to HHI. This aligns with Ghenimi & Chaibi (2002), who concluded that higher capitalization enables banks to adopt more diversified investment strategies, enhance risk management, and withstand losses more effectively. Banks with strong capital reserves are more inclined to adopt diversified investment strategies, as higher levels of capital decrease the incentives for excessive risk-taking(Yener Altunbas et al., 2019).

i. The Effect of Director Boards' Variables on Investment Diversification

The board-related variables analyzed include Board Size (BS), CEO Duality (CEOD), Executive Directors (EXD), Foreign Directors (FORD), and Gender Diversity (GD). Among these, EXD does not significantly affect NONII. The coefficients for BS, FORD, and GD in influencing NONII are -0.055, 0.055, and 0.049, respectively, while their impact on HHI reaches 1,447.508 and 1,494.743.

These findings contradict earlier research by Carter et al. (2003)along with Adams & Ferreira (2009), argued that diverse boards improve risk assessment and decision-making through varied perspectives, and which the variety of perspectives enhances decision-making processes, making the organization more adaptable and better equipped to navigate economic uncertainties (Fos et al., 2024).

The discrepancy may stem from the complex role of governance structures in financial outcomes. Broader governance elements, such as institutional ownership and audit committees, often shape investment strategies, potentially overriding the direct influence of board diversity on diversification (Carolina N., 2020).

Practical Implications

The significance of market competition and diversification in enhancing the financial stability of institutions is underscored by the study. Financial stability can be promoted by policymakers through the promotion of competition and the prevention of excessive market concentration. The study also underscores the importance of maintaining robust capital buffers, as it posits that institutions that are adequately capitalized are more capable of managing financial volatility. In order to assist banks in weathering economic downturns, regulatory bodies may implement policies that encourage increased capital adequacy.

Limitations of the Study

The study's narrow concentration on conventional banks restricts the generalizability of the findings to other types of financial institutions, such as Islamic banks or non-bank financial institutions. The study omits the challenges and strategies of smaller banks, which may have distinct risk profiles and limited resources, by concentrating on larger banks. Smaller institutions may also be more susceptible to regional economic disruptions and less capable of diversifying in comparison to their larger counterparts. The study is supported by publicly available data, which may be subject to inherent limitations, such as insufficient financial statements or reporting biases.

Recommendations for Future Research

Inclusion of a Broader Sample: To offer a more comprehensive perspective on diversification and risk management strategies in various financial contexts, the study should be expanded to encompass a broader spectrum of financial institutions, such as small and medium-sized banks and Islamic banks. Technological Innovation's Influence: Fintech and blockchain technology should be investigated in relation to their influence on investment strategies and risk management. There are new opportunities for risk mitigation and diversification as a result of

technological advancements that have disrupted traditional banking models. Regulatory Impact: Future research should evaluate the impact of various regulatory frameworks, including Basel III and local banking regulations, on the capacity of banks to manage risks and diversify. Research could investigate the impact of capital adequacy and liquidity requirements on the decisions of banks in a variety of regulatory environments. Market Changes and Globalization**:** Future research could investigate the extent to which the diversification strategies of banks are affected by changes in global financial markets, such as globalization and economic integration. The growing interconnectedness of global markets may expose banks to more severe systemic risks, necessitating the implementation of more sophisticated risk management strategies.

CONCLUSION

In this study, the role of liquidity risk, credit risk, profitability, macroeconomic variables (inflation and GDP), bank size, interbank ratios, capitalization, and governance is examined in relation to the factors that influence investment diversification in Indonesian conventional banks from 2013 to 2023. The results demonstrate that banks are compelled to make more concentrated investments in order to reduce risk due to liquidity and credit risks, while profitability facilitates diversification by allowing the allocation of resources to a wider range of portfolios. A higher concentration of investments is the result of macroeconomic factors such as inflation, which diminish the efficacy of diversification. Well-capitalized, larger institutions are more adept at diversifying their investments. Although board diversity is generally recognized as a factor in strategic decision-making, its direct impact on diversification is restricted, potentially as a result of the broad-based implications of governance structures. This investigation emphasizes the necessity of customized risk management strategies that are designed to balance both macroeconomic and bank-specific factors. It is suggested that banks concentrate on enhancing financial stability and diversification by focusing on improving profitability, capitalization, and risk management. Future research could further investigate the relationship between governance structures and diversification in order to gain a more comprehensive understanding of their combined impact.

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