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Ownership structure, income diversification, and banking resilience: Lessons from Indonesia's financial sector

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Abstract

This study examines the impact of income diversification on bank performance, emphasizing the moderating role of ownership structure. Using panel data from Indonesian banks, we employ the Moderated Regression Analysis (MRA) to assess how ownership structure influences the relationship between diversification and financial performance. The findings indicate that income diversification does not significantly enhance bank profitability, particularly in state-owned banks, which remain reliant on traditional lending activities. In contrast, private and foreign-owned banks benefit more from diversified income sources, allowing them to achieve greater financial stability. Additionally, ownership structure moderates this relationship, weakening the positive effects of income diversification on bank performance. Further analysis highlights that liquidity, bank size, and capital adequacy contribute significantly to performance, while economic crises negatively impact profitability. These findings underscore structural challenges in state-owned banks and the need for regulatory frameworks that support more effective income diversification strategies. This study further highlights the importance of income diversification in enhancing bank resilience, particularly in response to economic crises and financial shocks. Future research should explore the role of financial technology and digital banking in improving diversification outcomes and reducing systemic financial risks.

Keywords: Bank performance, digital transformation, financial regulation, income diversification, ownership structure.

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1. Introduction.

The COVID-19 pandemic has profoundly impacted global financial stability, leading to significant disruptions in banking systems worldwide. Financial institutions, particularly in emerging markets, have struggled to maintain stability as economic downturns, government-imposed restrictions, and shifts in consumer behavior have reshaped financial landscapes. The pandemic exacerbated credit risk, resulting in a surge in non-performing loans (NPLs) and a decline in profitability across multiple banking sectors. In ASEAN economies, the heightened NPL ratios due to widespread financial distress weakened overall bank performance [1]. Similarly, in Indonesia, state-owned banks suffered a decline in key financial ratios such as the Capital Adequacy Ratio (CAR) and Return on Assets (ROA), signaling a deterioration in financial health [2]. The global banking sector also faced comparable struggles, with reports indicating a sharp decline in profitability metrics like ROA, reflecting a widespread trend of financial instability [3]. These financial disturbances have underscored the critical need for effective strategies to enhance banking resilience and stability in future crises.

Emerging market banking systems, particularly in ASEAN and Indonesia, have been disproportionately affected by the pandemic. Research suggests that smaller, undercapitalized banks faced the most severe financial strains, revealing the importance of income diversification in mitigating financial shocks [4]. Banks with concentrated revenue streams, primarily dependent on interest-based income, experienced amplified financial distress due to increased borrower defaults and the restrictive economic environment. In contrast, institutions with diversified income sources demonstrated greater resilience in maintaining stable financial performance. The operational strategies and regulatory frameworks adopted prior to the pandemic played an essential role in shaping banking resilience. Banks with well-structured risk management practices were better positioned to weather the financial challenges imposed by COVID-19 [5]. Additionally, the pandemic accelerated the shift toward digital financial services, which provided critical support in maintaining operational continuity and customer engagement during lockdowns [6]. These developments highlight the growing necessity of diversification and digital transformation in the modern banking landscape.

The primary research problem addressed in this study is the role of income diversification in enhancing bank performance and resilience during economic crises, specifically within the Indonesian banking sector. The reliance of Indonesian banks on traditional interest-based income has historically exposed them to financial vulnerabilities during economic downturns. With the COVID-19 crisis revealing the limitations of this revenue model, it is imperative to assess whether banks that adopted diversified income strategies performed better in terms of financial stability and profitability. To examine this relationship, this study employs panel data regression based on Chow, Hausman, and LM tests before applying Moderated Regression Analysis (MRA) to analyze the moderating effect of ownership structure. Previous empirical studies provide valuable insights into the role of income diversification in financial stability. Islamic banks, which employ profit-sharing models instead of traditional interest-based lending, have demonstrated resilience during financial crises by leveraging unique financial structures that support economic development [7].

Furthermore, the ownership structure is a crucial factor influencing financial decision-making, affecting the extent to which banks implement diversification strategies. The ownership structure of banks, particularly the distinction between state-owned and privately owned banks, may play a decisive role in moderating the relationship between income diversification and financial performance during periods of economic uncertainty. The effectiveness of income diversification in ensuring financial stability is not uniform across all banking institutions. One key determinant influencing its success is the ownership structure, which shapes decision-making, risk appetite, and revenue allocation strategies. Several studies have explored the impact of income diversification on bank resilience, with mixed findings.

Several studies have explored the impact of income diversification on bank resilience, producing mixed findings. Some research suggests that diversified income streams can enhance financial stability by providing alternative revenue sources, thereby reducing risk exposure [8]. Conversely, others argue that diversification introduces operational and market risks that could negatively impact financial performance, particularly in banks with inadequate governance structures. Therefore, a comprehensive analysis is required to determine the extent to which income diversification supports banking resilience within Indonesia's financial sector. Additionally, banks that expanded into fee-based services, investment banking, and wealth management have reported increased non-interest income, contributing to their overall financial stability. However, the effectiveness of these diversification strategies is highly dependent on ownership structure and governance mechanisms. Some studies suggest that ownership concentration may promote disciplined financial strategies and risk mitigation, while others indicate that dispersed ownership could lead to misalignment between managerial decisions and shareholder interests [9]. Given these contrasting perspectives, this study seeks to analyze how ownership structure moderates the relationship between income diversification and bank performance in Indonesia.

Furthermore, this study contributes to ongoing regulatory discussions by highlighting the role of ownership structure in shaping income diversification outcomes, aligning with Basel III principles, capital adequacy requirements, and global banking supervision standards. Unlike findings from developed markets, where diversification consistently enhances stability, this study highlights structural barriers in state-owned banks that hinder diversification effectiveness in emerging economies.

A critical examination of the existing literature highlights the need to investigate the interaction between income diversification and ownership structure in determining bank resilience during financial crises. While diversification has been widely recognized as a potential stabilizing factor its effectiveness remains contingent on governance structures and regulatory frameworks. This study contributes to ongoing regulatory discussions by highlighting the role of ownership structure in shaping income diversification outcomes, aligning with global banking stability frameworks such as Basel III and risk-based capital supervision. Unlike findings from developed markets, where diversification consistently enhances stability, this study highlights structural barriers in state-owned banks that hinder diversification effectiveness in emerging

economies. Government interventions and regulatory policies have also played a crucial role in shaping banking responses to crises. Empirical studies suggest that well-structured regulatory frameworks, transparency measures, and corporate governance policies significantly contribute to mitigating excessive risk-taking behavior among banks [10]. Furthermore, timely capital injections and liquidity support from governments have proven effective in stabilizing banking systems during economic downturns [11]. However, the success of these interventions depends on the pre-existing financial health and governance structures of the banks involved.

This study aims to assess the impact of income diversification on bank performance during the COVID-19 pandemic and examine the moderating role of ownership structure in this relationship. By addressing the existing gap in the literature, this research provides empirical evidence on how different ownership structures influence the effectiveness of diversification strategies in enhancing financial resilience. Unlike prior studies that primarily focus on the direct impact of income diversification, this study positions ownership structure as a moderating factor, offering deeper insights into how governance models shape financial stability, particularly in emerging markets facing complex regulatory environments. By analyzing Indonesian commercial banks, this study delivers practical implications for policymakers, banking executives, and regulatory authorities in designing policies that enhance banking resilience. The findings contribute to the ongoing discourse on financial stability and provide recommendations for optimizing bank income structures in response to economic uncertainties.

2. Literature Review

The relationship between income diversification and financial performance in the banking sector has been a subject of extensive academic inquiry, yielding diverse conclusions. Numerous studies indicate that income diversification positively influences financial performance, particularly in commercial banks. Luu et al. [12] found that banks with diversified income sources tend to perform better as diversification mitigates risks associated with reliance on traditional interest income. This trend is particularly evident in retail-oriented banks that typically engage in low-risk, interest-bearing activities. According to this research, diversification into non-interest income streams enhances overall profitability and stability during economic downturns. Similarly, Kiptum [13] highlights that a bank's investment structure significantly impacts its income diversification levels, which in turn affect financial performance. These findings underscore the importance of strategic asset allocation in achieving optimal diversification.

However, not all studies agree on the benefits of income diversification. Some research suggests that while revenue diversification generally has a positive effect on bank performance, certain conditions, such as liquidity risk, can lead to negative outcomes [14]. This implies that the relationship between income diversification and financial performance is contingent on various internal and external factors, including market conditions and the specific strategies employed by banks. The Basel III framework emphasizes capital adequacy and risk management as key measures for banking stability. While diversification strategies can enhance financial resilience, regulatory capital constraints may limit the ability of banks to expand non-interest income activities. Emerging market banks must navigate these global regulatory standards while optimizing revenue diversification strategies. The mixed results in existing literature indicate the need for a nuanced understanding of the factors influencing the success of income diversification strategies.

Ownership structure plays a crucial role in shaping the success of income diversification strategies. Agency theory provides a robust framework for understanding how ownership structure influences financial decision-making in banks. According to agency theory, conflicts of interest can arise between shareholders (principals) and managers (agents), particularly in banks with dispersed ownership structures. This misalignment can lead to agency costs, where managers prioritize personal interests over those of shareholders, potentially resulting in suboptimal financial decisions [15]. In contrast, ownership concentration can mitigate these agency problems by aligning the interests of owners and managers. Kirimi [16] supports this notion, indicating that concentrated ownership structures enhance decision-making efficiency and reduce risk-taking behaviors, thereby improving financial performance. Research by Nwude et al. [17] further corroborates this argument, showing that concentrated ownership positively correlates with bank performance by reducing agency costs and fostering alignment between owners and managers.

The role of block shareholders in income diversification strategies is also an important consideration. Pham [18] found that the presence of large shareholders amplifies the positive effects of income diversification on bank performance. Conversely, in banks with more dispersed ownership, the lack of alignment may lead to increased risk-taking and less effective governance, ultimately impacting financial outcomes negatively [19]. State-owned banks often face regulatory constraints that limit their ability to diversify revenue streams, as government priorities may conflict with profit-maximizing strategies [9]. In contrast, private and foreign banks, which operate under market-driven incentives, have greater flexibility in adopting non-interest income models while complying with international capital regulations. These findings illustrate how ownership structure plays a critical role in shaping strategic financial decisions and risk management approaches within banking institutions.

The risks and benefits associated with non-interest income strategies in banks reveal a complex interplay between revenue diversification and financial performance. While many studies indicate that non-interest income can enhance overall profitability and provide a buffer against economic downturns, it also introduces various risks that banks must manage effectively. One key benefit of non-interest income is its potential to stabilize banks during periods of financial stress. For instance, Sanya and Wolfe [20] found that revenue diversification mitigates insolvency risks, particularly in emerging economies, by enhancing profitability through diversified revenue streams. This conclusion is supported by Hafidiyah and Trinugroho [21], who suggest that while trading revenues can increase bank risk, other forms of non-interest income contribute to reduced default risks. Delpachitra and Lester [22] further argue that non-interest income improves bank profitability but caution against over-reliance on such income due to associated risks.

Despite its benefits, non-interest income diversification carries notable risks. Hunjra et al. [23] documented an increase in financial instability when banks concentrate their revenue in non-interest income, particularly in South Asia, where revenue concentration negatively affected bank stability. Köhler [24] similarly found that while retail-oriented banks benefit from non-interest income, investment banks face increased exposure to risk when diversifying into non-traditional income sources. This finding suggests that the type of non-interest income is crucial in determining its impact on bank stability. Moreover, excessive reliance on non-interest income can lead to diminishing returns and increased volatility. Unlike banks in developed economies, which operate under well-established regulatory frameworks with stringent capital controls, banks in emerging markets face greater uncertainty and flexibility in income diversification [24]. In the European banking sector, for instance, regulators emphasize stress testing and risk-based capital requirements, while in Southeast Asia, regulatory frameworks tend to focus on liquidity management and credit risk mitigation Sharma and Anand [25]. Williams and Prather [26] found that as banks increase their non-interest income, they may face greater risk exposure, particularly if derived from volatile sources. This aligns with Zhao [27], who noted that a higher share of non-interest income is associated with increased risk and volatility in bank yields.

Government policies and central bank interventions play a crucial role in shaping bank profitability and risk exposure, particularly during economic downturns. These interventions can take various forms, including monetary policy adjustments, regulatory frameworks, and direct support measures for financial institutions. Central banks frequently lower interest rates during economic crises to stimulate lending and investment, enhancing bank profitability by increasing the volume of loans issued [20]. Additionally, regulatory policies that promote financial stability, such as capital requirements and liquidity support, help banks manage risk more effectively. Research indicates that banks operating under stringent regulatory environments exhibit lower risk profiles, as such regulations compel them to maintain adequate capital buffers and engage in prudent risk management practices [28].

In summary, a comprehensive analysis is required to determine the extent to which income diversification supports banking resilience within Indonesia's financial sector. While banks in emerging markets adopt more aggressive revenue diversification strategies, banks in developed economies often approach diversification with caution, reflecting their more stable regulatory environments and risk management practices. This review highlights the complexity of income diversification strategies and underscores the importance of considering ownership structures, regulatory frameworks, and economic conditions when evaluating bank performance.

3. Methods

3.1. Sample and Data Collection

This study collected financial data for commercial banks in Indonesia for the 2019-2021 period, sourced from quarterly reports of Commercial Banks, Sharia Business Units, and Sharia Commercial Banks published by the Otoritas Jasa Keuangan (OJK). The initial dataset comprises 99 commercial banks, classified based on ownership structure, as shown in Table 1.

Table 1.
Commercial Bank Population Data in Indonesia.

Group of Banks	Number of Banks
State-Owned Banks	4
Regional Development Bank	31
Domestic Private Banks	41
Foreign Banks	23
Total	99

Note: The table shows the number population base on ownership.

The research sample was determined using purposive sampling, selecting banks based on specific criteria aligned with the research objectives. Exclusion criteria include banks with incomplete financial data, banks involved in mergers or acquisitions, subsidiary banks already consolidated by their holding companies, and newly established banks from 2020 onward. Table 2 presents the sample selection process, outlining the exclusion criteria applied to the initial population of banks. The final sample distribution based on ownership structure is displayed in Panel B.

Table 2.
Sample Selection and Ownership Structure.

Panel A: Sample Selection Procedure		
Criteria	Number of Banks	Observations
Initial Population	99	1,188
Exclude: Incomplete Data	-7	-84
Exclude: Banks Conducting Acquisition or Consolidation	-4	-48
Exclude: Subsidiary Bank (Already Consolidated by Holding Bank)	-1	-12
Exclude: New Banks Founded During 2019-2021	-4	-48
Final Sample	83	996
Panel B: Sample Distribution by Ownership Structure		
Ownership Type	Number of Banks	Percentage (%)
State-Owned Banks	4	4.80%
Regional Development Banks	26	31.30%
Domestic Private Banks	30	36.20%
Foreign Banks	23	27.70%
Total	83	100.00%

Notes: Panel A describes the sample selection criteria.
Panel B presents the distribution of the final sample by ownership structure.

3.2. Variables and Measurement

The study measures bank performance using the Return on Assets (ROA) ratio, a widely accepted metric in banking literature. ROA reflects the profitability of a bank relative to its total assets, indicating operational efficiency and financial health. Income Diversification (DIV) is the key independent variable, quantified using the Herfindahl-Hirschman Index (HHI) of income sources. A lower HHI score suggests greater diversification into non-interest income sources such as fees, commissions, and investment revenues, whereas a higher score indicates a concentration in interest-based income. Ownership Structure (OS) serves as the moderating variable. This is operationalized as a categorical dummy variable, where state-owned banks are coded as 1, and private and foreign-owned banks as 0. To ensure robustness, the study includes several control variables: Liquidity Risk (LDR), measured as the Loan-to-Deposit Ratio; Bank Size (LNASET), represented by the natural logarithm of total assets; Bank's Equity (EQR); and a macroeconomic variable (CRISIS), which takes a value of 1 for the COVID-19 pandemic years and 0 for the pre-pandemic years.

To analyze the role of ownership structure in shaping the impact of income diversification, this study applies Moderated Regression Analysis (MRA). This method facilitates the assessment of interaction effects, providing deeper insights into how ownership concentration influences diversification strategies. Kiptum [13] emphasized the relevance of MRA in evaluating financial decision-making in banks. The following regression equations are estimated:

$$\boldsymbol{Y} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}\, \boldsymbol{DIV}_{it} + \varepsilon_{it} \quad (1)$$

$$\boldsymbol{Y} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}\, \boldsymbol{DIV}_{it} + \boldsymbol{\beta}_2\, OS_{it} + \varepsilon_{it} \quad (2)$$

$$\boldsymbol{Y} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}\, \boldsymbol{DIV}_{it} + \boldsymbol{\beta}_2\, OS_{it} + \boldsymbol{\beta}_3\, \boldsymbol{DIV}_{it} * OS + \boldsymbol{\beta}_4\, LDR_{it} + \boldsymbol{\beta}_5\, EQR_{it} + \boldsymbol{\beta}_6\, LNASET_{it} + {}_7\, CRISIS_{it} + \varepsilon_i \quad (3)$$

Description of Model:

$\boldsymbol{Y}$/ROA	= Bank's Performance
$\boldsymbol{\alpha}$	=Constanta
$\boldsymbol{\beta_1}$-$\boldsymbol{\beta}_7$	= Regression Coefficient
X_1/DIV	= Diversification
X_2/OS	= Ownership Structure
X_3/DIV*OS	= Diversification x Ownership Structure
X_4/LDR	= Liquidity Ratio
X_5/EQR	= Bank's Equity
X_6/LNASET	= Bank's Size
X_7/CRISIS	= Crisis (Pandemic Covid-19)
Ɛ	= Error term
i	= 1,2,..., N
t	= 1,2,..., t

Panel data regression techniques can be estimated using three approaches: Common Effect Model (CEM), Fixed Effect Model (FE), and Random Effect Model (RE). To determine the most appropriate model, the following statistical tests are conducted: Chow Test to determine if the fixed effects model is preferred over pooled OLS, then Hausman Test to compare fixed and random effects models, and finally, the Lagrange Multiplier (LM) Test to test whether a random effects model is appropriate.

4. Result and Discussion

Based on the results of the Chow test, Hausman test, and LM test (see Table 3), the Fixed Effects Model was selected once through the Chow Test, which had a chi-square p-value of 0.0000 < 0.05. Meanwhile, the Random Effects Model was chosen based on the Hausman Test and the LM Test, with a cross-section probability value of 0.6726 > 0.05 and 0.0000 < 0.05, respectively. The Common Effects Model was not selected in any of the tests.

These results indicate that, among the three models (Common Effect, Fixed Effect, and Random Effect), the Random Effects Model (REM) is the most appropriate for interpreting panel data regression in this study. The REM was chosen as it accounts for unobserved heterogeneity across entities while assuming that individual effects are uncorrelated with the independent variables.

The classical assumption tests (heteroscedasticity and autocorrelation tests) were not conducted in this study, as the Generalized Least Squares (GLS) estimation method used in the Random Effects Model (REM) is expected to handle these issues efficiently.

Table 3.
Panel data regression model selection test results.

No	Test	Criteria	Result	Conclusion
1	Chow Test	α < 0.05: Fixed effect Model is preferred	**0.0000 < 0.05**	Fixed effect Model selected
2	Hausman Test	α > 0.05: Random Effect Model is preferred	**0.6726 > 0.05**	Random effect Model selected
3	LM Test	α < 0.05: Random Effect Model is preferred	0.0000 < 0.05	Random Effect Model selected

Note: Processed using E-Views, 2022.

4.1. Moderated Regression Analysis (MRA)

The analysis in this study uses Moderated Regression Analysis (MRA), with the dependent variable being Return on Assets (ROA) and the independent variable being Income Diversification (DIV), while the moderating variable is Ownership Structure (OS). We added control variables, namely LDR, Total Assets (LNASET), EQR, and Crisis. Through MRA, the value of each regression equation is obtained as follows:

$$ROA = 0.486522 + 0.014827\ DIV + \varepsilon it \quad (1)$$

$$ROA = -0.321449 + 0.013440\ DIV + 0.725034\ OS + \varepsilon it \quad (2)$$

$$ROA = -3.444870 + 0.006299\ DIV + 0.400580OS - 0.009110\ OSDIV + 0.003514\ LDR + 0.268520\ LNASET + 0.026074\ EQR - 0.263058CRISIS + \varepsilon it \quad (3)$$

Table 4 presents the regression results examining the effect of Income Diversification (DIV) on Return on Assets (ROA) and the moderating role of Ownership Structure (OS) in this relationship. The analysis follows a stepwise regression approach: the first model evaluates the direct effect of DIV (Equation 1), the second incorporates OS as an independent variable (Equation 2), and the final model includes interaction terms to assess the moderating impact of OS (Equation 3). The detailed results are summarized in Table 4.

Table 4.
Regression Results for Income Diversification and Ownership Structure.

Model	Variable	Coefficient [P-Value]	Adj R^2	F-Statistic
Equation 1	DIV	0.014827 [0.1637]	0.095	0.163535 (0.163535)
Equation 2	DIV	0.013440 [0.2069]	2.6	2.275055 (0.103327)
	OS	0.725034 [0.1068]		
Equation 3	DIV	0.006299 [0.4502]	91.7	1575.771 (0.000000)
	OS	0.400580 [0.3904]		
	OSDIV	-0.009110[0.0443]		
	LDR	0.003514 [0.0000]*		
	LNASET	0.268520 [0.0063]		
	EQR	0.026074 [0.0000]*		
	CRISIS	-0.263058[0.0000]*		

Note: Processed using Eviews, 2022. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

4.2. Partial and Simultaneous Hypothesis Testing

The regression results presented in Table 4 examine the effect of Income Diversification (DIV) on Return on Assets (ROA) and the moderating role of Ownership Structure (OS). The results indicate that DIV does not significantly impact ROA in Equation 1, with a p-value of 0.1637. The introduction of OS in Equation 2 does not alter this effect significantly (p = 0.2069). However, the interaction term OSDIV in Equation 3 is significant at the 5% level (p = 0.0443), suggesting that ownership structure weakens the relationship between income diversification and bank performance. Additionally, LDR, LNASET, and EQR show positive and significant effects on ROA, while CRISIS has a significant negative effect, indicating that macroeconomic instability negatively affects bank performance. These findings highlight the critical role of ownership structure in determining the effectiveness of income diversification strategies. As discussed in the previous section, the insignificant diversification of assets on bank performance is due to the relatively small composition of non-interest income

compared to interest income. This reality shows that traditional banking activities in Indonesia are still very dominant, so non-traditional activities undertaken by banks are more aimed at hedging in addition to profit distribution, resilience to downside risks and overall company risk reduction [29]. In line with the results of research by Paltrinieri et al. [30], it is evident that state-owned banks tend to strengthen income in traditional activities (i.e., deposits and credit) because they are considered the most stable and measurable compared to non-interest income. Non-interest income for banks has its level of vulnerability to market, operational and reputation risks, not to mention greater volatility despite having a more promising rate of return. Asif and Akhter [31] emphasized that diversification is a risk mitigation effort. Ahamed [32] proved that activities in non-interest operations could reduce the impact of deteriorating credit portfolio quality so that credit losses could be offset by fee-based income.

Simultaneous testing is carried out to determine the independent variable's influence on the dependent variable in Equation 3. The results prove that the independent variable has a significant impact simultaneously on the dependent variable; the level of significance indicates this through the p-value of the F statistic < 0.005, which can be observed in Table 4. Next, the results of the coefficient of determination test are carried out to determine the ability of the independent variable to explain the variation of the dependent variable. The greater the adjusted R Square value, the greater the power of the independent variable to clarify the interpretation of the dependent variable in the research model. The value of the coefficient of determination (Adjusted R Square) in this study shows a value that varies for each equation. In Equation 1, it has an Adjusted R Square of 0.095%, and in Equation 2, it has an Adjusted R Square of 2.6%; then, in Equation 3, the Adjusted R Square is 91.7%. Based on the coefficient of determination test, it can be concluded that Equation 3 is the best research model compared to Equations 1 and 2. Based on the statistical results in Equations 1 and 2, it is found that the adjusted R-squared value is low, and then in Equation 3, we add control variables to improve the model study. The control variables used are LDR, Ln Assets, EQR and Crisis. The estimation results after adding control variables prove that LDR, Ln Assets, EQR and Crisis significantly affect ROA at the 1% level. The results of the regression test show that the LDR, Ln Assets, and EQR variables have a significant positive effect on performance; these results provide an empirical understanding of banks that have LDR, Ln Assets (bank size), and a high EQR will improve performance while the crisis variable has a significant negative effect on performance, namely, the occurrence of a crisis can cause a decline in bank performance.

To examine whether ownership structure moderates the relationship between income diversification and bank performance, the type of moderator variable is determined by comparing the results of the Moderated Regression Analysis, as shown in Table 5.

Table 5.
Result of Moderated Regression Analysis.

Variable	Coefficient	t-Statistic	P-Value
C (Constant)	-3.44487	-1.855664	0.0638
DIV(Income Diversification)	0.006299	0.755422	0.4502
OS (Ownership Structure)	0.40058	0.859251	0.3904
OSDIV (Interaction Term: DIV × OS)	-0.00911	-2.013753	0.0443
LDR (Liquidity Ratio)	0.003514	105.5671	0.0000***
LNASET (Bank Size)	0.26852	2.744719	0.0062**
EQR (Bank's Equity Ratio)	0.026074	2.737715	0.0063**
CRISIS (Macroeconomic Crisis Dummy)	-0.263058	-4.378183	0.0000***

Note: Processed using EViews, 2022. *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

As shown in Table 5, the coefficient for OS (β_2) is not significant (p = 0.3904), whereas the interaction term (OSDIV) is significant at the 5% level (p = 0.0443). This confirms that ownership structure serves as a pure moderator, exerting an indirect rather than a direct effect on bank performance. The negative coefficient for OSDIV (-0.009110) indicates that ownership structure attenuates the positive impact of income diversification on ROA, limiting its effectiveness in state-owned banks. This finding suggests that regulatory constraints and government intervention in state-owned banks hinder their ability to leverage income diversification strategies, making them less adaptable to market-driven revenue sources compared to private and foreign-owned banks.

These results provide an empirical understanding that income diversification carried out by state-owned banks can reduce bank performance. The concentration of government ownership can hinder the company's performance due to the limited ability of good management; the government tends to intervene in the company's performance for its own sake. According to some perspectives, government-owned enterprises managed by bureaucrats may prioritize political interests over business efficiency and community welfare. This behavior impacts the reduction of government control over the manager as the manager of the company [33].

These results also confirm that the existence of state banks from the very beginning was designed to facilitate transactional activities carried out by the central or regional government. These transactional activities are related to the distribution of budgeting and expenditures related to government interests, while other features are added. For this reason, state-owned banks have a lower risk appetite compared to private banks or foreign banks, which are trying to maximize their profits through various potential income that can be obtained.

The relationship between shareholders and government managers is explained by agency theory. As the controlling shareholder, the government supervises and controls managers' performance, but often the government has other motives besides optimizing performance. This study's results align with the research of Pennathur et al. [34] that publicly-owned

banks in India have lower income diversification than foreign banks. Besides having a high-interest income, the low diversification of assets is due to the low level of technological mastery compared to foreign banks and the limited experience they have, pushing public-owned banks to rely more on traditional sources of income. Furthermore, Rakhe [35] proves that public sector banks have less diversified sources of bank income and are more dependent on deposits to finance operations.

4.3. Impact of COVID-19 on Income Composition Across Different Ownership Types

The COVID-19 pandemic significantly altered the income composition of banks, with distinct impacts observed across different ownership structures. For state-owned banks, the pandemic led to an increase in non-performing loans (NPLs), reduced credit expansion, and a heightened reliance on government-backed financial support. Nortuah and Paranita [2] reported a rise in NPL ratios from 2.68% before the pandemic to 3.58% during the crisis, illustrating the challenges faced by state-owned financial institutions.

Conversely, private banks exhibited greater adaptability by shifting towards digital financial services and increasing reliance on fee-based income. Wahyuni et al. [36] found that private banks effectively leveraged technology to enhance their non-interest income, thereby offsetting declines in traditional interest revenue. This shift highlights the strategic advantages of income diversification in mitigating financial shocks. Moreover, research by Gazi et al. [37] on Bangladeshi banks found similar trends, suggesting that private banks with strong technological infrastructure were better positioned to navigate the financial uncertainties posed by the pandemic.

Foreign-owned banks also exhibited distinct income diversification strategies during the pandemic. Research by Pham [18] indicates that foreign banks, with their access to global capital and advanced financial technologies, were more effective in maintaining profitability by expanding their range of non-traditional banking services. These findings reinforce the argument that ownership structure plays a pivotal role in determining the effectiveness of income diversification strategies, particularly during periods of economic uncertainty.

4.4. Patterns in Bank Ownership and Financial Performance

Statistical analyses of bank ownership structures reveal distinct patterns in financial performance. Research by Nortuah and Paranita [2] indicates that state-owned banks in Indonesia experienced notable declines in key financial ratios, such as the Capital Adequacy Ratio (CAR) and ROA, during economic downturns. This trend highlights the vulnerabilities associated with state ownership, particularly in times of financial distress. Conversely, private banks have demonstrated greater agility in adapting to market changes, resulting in more stable performance metrics. Čiković et al. [38] further corroborated this finding by showing that privately-owned banks outperformed state-owned banks during economic crises, primarily due to their ability to implement swift strategic adjustments.

The relationship between ownership concentration and financial performance has been widely explored in banking literature. Studies indicate that banks with concentrated ownership structures tend to exhibit superior financial performance, as decision-making is more streamlined and aligned with long-term profitability goals. Kirimi [16] emphasizes that ownership structure significantly influences risk-taking behavior and strategic direction, with concentrated ownership often leading to more disciplined financial management. However, some studies suggest that excessive ownership concentration may limit corporate governance effectiveness, resulting in potential inefficiencies in decision-making processes.

4.5. Comparison of Indonesian Banks to Global Benchmarks in Terms of Income Diversification

When compared to global banking trends, Indonesian banks have exhibited distinct income diversification patterns. While financial institutions worldwide have been gradually shifting towards non-interest income sources to mitigate risks associated with traditional banking activities, Indonesian banks have embraced this trend at varying levels. Research by Kurniawan and Siswanto [39] suggests that while some banks have successfully diversified their income streams, others continue to rely heavily on interest-based earnings, making them more susceptible to interest rate fluctuations and credit risks. The adoption of financial technology has further accelerated the diversification process, with banks leveraging digital payment platforms, wealth management services, and investment advisory solutions to enhance revenue streams.

Indonesian banks have made notable strides in improving financial resilience by incorporating income diversification strategies similar to those observed in developed economies. However, the extent to which banks have embraced diversification varies significantly depending on ownership structure, market positioning, and regulatory frameworks. For instance, banks operating in highly competitive environments tend to exhibit greater income diversification, as they seek to differentiate their services and expand revenue-generating activities beyond traditional lending operations.

5. Conclusion

This study examines the impact of income diversification on bank performance, with a particular focus on the moderating role of ownership structure. The results from the Moderated Regression Analysis (MRA) indicate that while income diversification alone does not significantly enhance bank profitability, ownership structure plays a crucial role in shaping its effectiveness. State-owned banks remain reliant on traditional lending activities, limiting their ability to benefit from diversification strategies. Conversely, private and foreign-owned banks have demonstrated greater adaptability, leveraging technology and financial innovation to generate stable non-interest income streams.

Further, the study highlights that liquidity (LDR), bank size (LNASET), and capital adequacy (EQR) significantly contribute to bank performance, reinforcing the importance of financial stability measures. However, economic crises negatively impact bank profitability, underscoring the need for proactive risk management strategies. The ownership structure is confirmed to act as a pure moderator, weakening the positive relationship between income diversification and performance,

suggesting that government-controlled banks face institutional constraints that hinder diversification effectiveness.

These findings align with global banking regulatory concerns, particularly within the Basel III framework, which emphasizes capital adequacy and risk-based supervision. Policymakers should design regulations that balance the need for income diversification with financial stability, ensuring that banks do not over-rely on volatile non-interest income sources. In emerging markets, greater regulatory support for digital financial services could enhance income diversification effectiveness while maintaining risk management integrity.

The role of financial technology (fintech) and digital banking in income diversification should be further emphasized, as evidence suggests that banks leveraging digital financial services are more successful in stabilizing revenue streams. Future policies should encourage investment in fintech solutions to enhance the resilience of income diversification strategies.

Future research should explore the longitudinal effects of financial technology on income diversification and assess the impact of new regulatory frameworks on diversification strategies. Additionally, comparative studies between developed and emerging markets would provide further insights into the effectiveness of income diversification in different regulatory environments. Strengthening corporate governance in state-owned banks and fostering an environment conducive to revenue diversification will be key to promoting long-term banking resilience in Indonesia and beyond.

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