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Does Diversification Lead to the Financial Stability and Efficiency of Commercial Banks in Ethiopia? A Simultaneous Equation Approach

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Abstract

The purpose of this study is to investigate the impact of diversification on the financial stability and efficiency of commercial banks in Ethiopia. The data was obtained from a sample of 17 banks from both the public and the private sector operating in Ethiopia for more than a decade. The balanced panel presented operational and financial stability and efficiency metrics for the decade starting from 2013. A seemingly unrelated regression model was used to estimate the impact of diversification on bank stability and efficiency by controlling endogeneity between diversification, stability, and efficiency. The study found that geographic, asset, and sectoral credit diversification, as well as intellectual capital efficiency, significantly improve bank stability, while investment diversification has mixed effects, and income and deposit diversification have negligibly positive effects. The study further found that geographic, asset, sectoral credit, and deposit diversifications have a significant negative effect on the efficiency of commercial banks. The results of this study provide valuable insights. Bank managers can better understand the impact of diversification on banks' financial stability and efficiency. This study encourages policymakers and the top management of respective banks to pursue strategic geographic, asset, and sectoral credit portfolio diversification to maintain their financial stability and efficiency. To the best of our knowledge, this is one of the rare studies to investigate the effect of diversification on the financial stability and efficiency of commercial banks in Ethiopia.

Keywords: diversification, financial stability, efficiency, Herfindahl–Hirschman index, commercial banks, Ethiopia

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Introduction

A national economy consists of organizations and markets that raise capital for investment and finance projects, with financial institutions acting as intermediaries to manage risk [1]. Financial system development is crucial for a nation's economic growth, necessitating upgrades through financial innovation, regulation, legal system improvement, efficient fund mobilization, and improved service delivery [2; 3]. Banks are essential financial institutions that offer loans, securitization, and bond issuance. They underwrite debt securities and leverage balance sheets and participate in derivative markets, impacting capital costs through swaps and certificates of deposits [4]financial institutions, capital markets and institutional investors are also sources of long-term finance that is finance which is available for an extended period of time1. The importance of long-term finance lies in its pivotal role in satisfying long-term physical investment needs across all sectors in the economy and specifically in key drivers of growth, competitiveness and employment such as the infrastructure, real estate, R&D and new ventures. Traditionally, banks have been a key player in the financial system, transforming savings into long-term capital to finance private sector investment. Over time, two main changes have taken place in the structure of the financial system. First, the banking model has evolved, becoming increasingly dominated by wholesale markets and in particular derivatives, to the detriment of the more traditional deposit-taking and lending activities. Second, disintermediation and the growth of capital markets has led to a shift in the structure of the financial sector, with institutional investors such as pension funds, insurance companies, mutual funds, and, most recently, sovereign wealth funds, also becoming central players as providers of long-term capital. After the financial crisis, the traditional sources of investment financing are all facing challenges – whether it be fiscal constraints on government spending, or the weak economic outlook not proving conducive to corporate investment (with implications for both the debt and equity markets. Banks usually have significant control over the financial systems of developing nations. Bank deposits are the primary type of household savings, whereas bank loans are the primary means of obtaining external funding for companies [5]. Crucial for facilitating capital flow, the banking industry acts as an intermediary in the financial system and promotes economic stability and development by transferring funds between surplus and deficit areas [6]. Banks receive deposits or loans from money markets and utilize excess funds to generate loans or acquire stocks. Interest rates serve as value indicators for individuals, organizations, and governments [7]. The financial performance of banks is crucial for economic growth, contributing significantly to GDP and catalysing economic expansion [8].

In the 21st century, diversification has become a topic of debate among scholars of the banking sector. There are arguments in support of and against its effect on banks' financial stability and efficiency. There are differing opinions on the influence of diversification on banks' financial stability, with some arguing that diversification has a detrimental effect and others stating that it has a positive effect. To enhance performance and remain stable in a competitive market, banks are forced to diversify businesses and apply value-added innovative activities such as value-added intellectual capital. Intellectual capital is a crucial intangible asset that may help organizations, particularly the banking sector, to achieve their objectives, yet it is often overlooked. Moreover, few studies have explored the relationship among diversity, financial stability, and efficiency in the banking industry, specifically in developing nations, by including intellectual capital as a variable. The few scholarly works that treat developing countries such as Malaysia, Indonesia, Kenya, Ghana, Bangladesh, and Ethiopia [9–14] use different variables and methodologies. In addition, there are inconsistent findings about the effect of diversity on financial stability across various countries. For instance, [11]commercial banks have been diversifying their business by increasingly offering new services such as mobile banking, agency banking, bank-assurance, faceless banking and integrating microfinance in their banking system. Diversification by the commercial banks is premised on the need to enhance financial performance. This has mainly emanated from banking industry having undergone numerous regulations regimes which over the years have affected financial performance of these entities. Empirical literature shows that diversification may not always lead to higher financial performance due to increased overheads and exhausted economies of scale. The study sought to determine the effect of diversification on financial performance of commercial banks in Kenya. The specific objectives of the study were to determine the effect of income diversification on financial performance of commercial banks in Kenya, to examine the effect of geographical diversification on financial performance of commercial banks in Kenya and to examine the effect of product diversification on financial performance of commercial banks in Kenya. Secondary data used by the study was collected for five years period (2013-2017 on annual basis found that geographical and income diversification has a significant and positive impact on the competitiveness of commercial banks in Kenya, while asset diversification has a negative yet insignificant impact. On the other hand, [12] investigated bank portfolio diversification, which has a significant positive effect on performance and competitiveness, and found that bank size significantly moderates the relationship between diversification and performance. Further, [10] showed that diversification of asset and income adversely affects cost efficiency, financial stability, and profitability while human capital efficiency has a significant positive effect and significantly mediates the association between diversification and bank performance. Moreover, these studies, far from being detailed and comprehensive, consider only a few diversification schemes as explanatory variables. Furthermore, the few studies that have been conducted on the impact of intellectual capital on financial stability and efficiency in the banking sector, particularly in the context of developing countries, gave mixed results in different countries.

In this regard, exploring the impact of diversification on the financial stability and efficiency of banks is very important for an emerging economy such as Ethiopia, where the government dominates the financial sector. Despite facing significant pressure from the United States, the Ethiopian government persists in enacting legislation prohibiting foreign banks' entry into the country. The presence of barriers to entry into the banking industry strengthens inefficient state-owned firms by providing them with protection. The government is apprehensive that permitting foreign banks to operate in Ethiopia could potentially result in a loss of economic control. The basis of this position is rooted in the argument of the infant industry: by implementing a prohibition on foreign bank entry at present, the domestic banking sector would be safeguarded against potential weakening resulting from unjust competition posed by foreign banks [13]. The government of Ethiopia has taken small steps toward liberalizing its tightly controlled financial sector by granting licenses to foreign-owned banks such as Kenya's Equity Bank and the Kenyan Central Bank, enabling them to create subsidiaries in a country of more than 115 million people. The Ethiopian banking industry comprises the National Bank of Ethiopia, a state-owned development bank, a public commercial bank, and 29 private commercial banks [14]. Therefore, this study aims to investigate the impact of diversification and intellectual capital on the financial stability and efficiency of Ethiopian commercial banks. This study is mainly based on portfolio theory, stakeholder theory, resource-based view theory, and agency theory, which were not considered by earlier studies. Therefore, the findings of this study should benefit the banking sector by identifying the role of diversification in enhancing financial stability and efficiency, thereby reducing risk. Therefore, it encourages the government and policymakers to take policy and regulatory measures to facilitate the financial system in order to smooth the development and stability of the country's economy. Earlier studies in Ethiopia were conducted on the impact of each diversification scheme separately, such as income diversification, investment diversification, or credit diversification, on the financial performance of commercial banks [15]. As a result, detailed compressive research incorporating a greater number of diversification schemes (income, asset, geographical, sectoral, investment, and deposit diversification) is essential, particularly for developing countries such as Ethiopia. In addition, this study employs an advanced econometric model using the simultaneous equation approach and, in particular, Seemingly Unrelated Regression (SURE) to capture endogeneity issues among variables. Hence, this study explores the effect of diversification through different diversification schemes on banks' financial stability and efficiency.

Literature Review and Hypothesis Development

Diversification is a very challenging concept to define in real terms. An issue that arises from the ambiguity of diversification or relatedness indices is the contradiction of findings that previously seemed to support the same stance. The often-employed metrics of related diversification lack reliability as measures of relatedness within business portfolios, posing a significant challenge for academics. Managers also face genuine difficulties as a result. Because of its complexity, the definition of diversification proves to be very subjective [16]. Diversification involves transferring risk from one institution to another, and recent financial system transformations, such as deregulation, have allowed institutions to expand operations and diversify into nontraditional sectors [17]. The scope of diversification in business seems to be more extensive than its adversaries acknowledge [16].

Deregulation has facilitated institutional expansion, leading to conglomerates that combine banking, securities, and insurance activities in one organization [17]. Diversification in financial institutions is often regarded as promoting financial system stability. However, there is a cost to diversification: while diversification reduces each institution's individual probability of collapse, it increases the likelihood of systemic crises [18]. Bank stability is positively correlated with competition and revenue diversification. Competition enhances stability when banks expand their range of activities that generate both interest and noninterest income internally and externally [19]. Banks that diversify their income sources differentiate themselves from those specializing in a limited set of services, resulting in special treatment based on random assignment [20].

As competition intensifies and the net interest margin (NIM) increases, along with a more extensive banking sector, the incentives for taking risks, such as setting aside funds for nonperforming loans, also increase. Moreover, heightened competition, financial gain, nonperforming loans, and the extent of the banking sector constrain the potential to generate money from many sources [21]. Compared to banks with a greater variety of services, more specialized banks tend to have greater profits, reduced expenses, improved profit efficiency, and enhanced cost efficiency. Risk-taking may increase due to aggressive diversification measures [22]. Diversification in today's competitive landscape is vital for enhancing profitability, market value, and shareholder value, but performance can decline due to instability in return on investment, equity, or liquidity [23]. Due to resource constraints, commercial banks can improve their financial performance through innovation. Financial innovation has produced opportunities for sector participants and established new market actors due to unique financial products[24];[25]. Financial technology has allowed many commercial banks to adopt e-banking services, which save time and effort, promote innovation, and lower costs. These services are available 24/7, allowing banks to expand their customer base [26]. The question of whether technology yields superior financial outcomes and enhances productivity has been a subject of ongoing discussion. In recent years, we have seen remarkable advancements in financial technology.

New information technology business requirements are changing banking. Internet, wireless, and worldwide straight-through processing have made banking virtual [27; 28].

[29] examined the anatomy of diversification and discovered that banking has expanded globally in recent decades, while nonfinancial firms have focused on their core operations. Diversification schemes and control variables affect the results. More focused banks make higher profits due to lower costs, profit efficiency, and cost efficiency. In addition, banks with more foreign ownership may see a decreased diversity discount, a smaller profit decline, or an increase in expenses[22]. [12] investigated how bank portfolio diversification positively impacts performance and competitiveness. Knowledge-based capital is becoming more important, especially in information-driven economies. Creative banking is heavily influenced by intangible assets. Financial liberalization and deregulation have altered conventional banking, increasing competition and decreasing interest earnings. Banks must engage in nontraditional business activities to compensate for revenue loss [12]. The testable research hypotheses in this study are formulated in the alternative hypothesis format as follows. The hypotheses are not specified as positive or negative in direction, because previous authors found inconclusive results regarding the impact of diversification on financial stability and efficiency of commercial banks. Hence the testable hypotheses are supported by the literature in the upcoming section.

Goetz et al. (2012) [30] investigated how a US bank's market valuation is impacted by an increase in the geographic variety of its assets. They utilized the unique, time-dependent trends of interstate bank deregulation to isolate the external factors influencing the geographic variety of bank assets. [31] investigated the inflence of diversity on the financial performance of commercial banks. Geographic diversification is positively correlated with returns on assets and equity, providing support for the resource-based view and market power theories. [32] conducted an empirical investigation to examine the influence of diversity on the financial performance of commercial banks operating in Kenya. [33] used the quantile regression approach to investigate the relationship between geographical diversification, firm size, and profitability in Malaysia. Inconclusive findings have been obtained in different industrialized nations on the relationship between geographical diversification and profitability. [34] showed that diversified banks demonstrate increased loan supply in borrower countries during banking crises. Increased credit availability results in greater investment by firms and a rise in employment. Diversified banks are more stable, because they can secure extra funding in times of trouble. [11] found that geographical and income diversification positively affects the competitiveness of commercial banks in Kenya, whereas asset diversification has a negligibly detrimental influence.

H_1: Geographic diversification has a significant effect on the financial stability and efficiency of commercial banks

[35] analysed the impact of income diversity on risk-adjusted bank performance in the Turkish banking sector using System-GMM estimators. Its results indicate that diversifying income significantly enhances the risk-adjusted financial performance of Turkish deposit banks. [34]; [36] found a strong and statistically significant correlation between competition and stability, particularly when risk-adjusted profits are employed as the outcome variable. They also revealed that revenue diversification contributes to both enhancing risk-adjusted profitability and decreasing the probability of banks becoming insolvent. Income diversification among different income sources other than interest income has a significant positive effect on bank performance, and a liquidity ratio along with financial stability facilitates the relationship between the two variables [37]. The diversification of income and assets significantly enhances the profitability of commercial banks in Bangladesh. Bank profitability is significantly and negatively affected by bank size, credit risk, cost management, and inflation [38].

H_2: Income diversification has a significant effect on the financial stability and efficiency of commercial banks.

[34] examined how the diversity of loan and asset portfolios affects bank performance in transitioning economies. Asset diversity has a positive association with bank performance, while loan diversification has a negative association. [39] analysed how asset diversification impacts bank performance in three Asian Islamic nations with dual banking systems. An analysis of banks in Indonesia, Malaysia, and Pakistan over the period 2006–2012 suggests that asset diversification impacts bank performance. A study of the complete sample shows that diversification negatively impacts conventional banks' profitability and asset quality but not cost efficiency. [40] discovered that in terms of asset diversification, government loans and non-interest-bearing assets significantly reduce bank risk, while mortgage loans and non-classified loans have the reverse effect. [41] investigated the influence of asset diversification on credit risk and market risk. [42] revealed that the influence of asset diversification does not exhibit statistical significance.

H_3: Asset diversification has a significant effect on the financial stability and efficiency of commercial banks.

[43] examined the effect of portfolio diversity on the financial performance of a sample of 40 corporate banks in Kenya. The study showed that several factors, such as investments in insurance, real estate, and government securities, influence the financial performance of commercial banks in Kenya. [15] studied the effects of investment diversification on the financial performance of commercial banks operating in Ethiopia. The findings indicate that financial asset investment, loan portfolio investment, government security investment, insurance investment, and investment size have a statistically significant and positive influence on the financial performance of commercial banks, as measured by return on assets.

H_4: Investment diversification has a significant effect on the financial stability and efficiency of commercial banks.

[44] conducted an empirical study of the impact of specialization vs. diversification on the returns and risks of banks. The key findings of the study indicate that diversifying industrial loans leads to a decrease in bank returns while simultaneously generating riskier loans for all banks in the sample with a stronger impact on high-risk banks. Sectoral loan diversification, on the other hand, only creates an inefficient risk-return trade-off for high-risk banks. [36] explored the connections between loan diversification, performance, and stability. The findings indicate that diversifying loan portfolios improves bank stability, as measured by the Z-score index, and increases profitability. [45] examined the impact of bank portfolio diversification on the financial performance of commercial banks in Kenya. The study revealed that non-lending operations can improve banking performance through internal capital market efficiency, economies of scale, cross-selling, and cross-subsidization.

H_5: Sectoral credit diversification has a significant effect on the financial stability and efficiency of commercial banks.

[22] examined the effects of focus vs. diversity on Chinese banks' performance. The study found that deposit diversification reduces earnings and raises costs. These results hold regardless of diversity and performance measurements. It also found that banks with foreign ownership and conglomerate connections have fewer diversification diseconomies, suggesting that they mitigate diversification diseconomies. [45] examined the impact of deposit diversification on the ROE and ROA of Kenyan banks. The study revealed that the diversification of deposits significantly improved banks' financial performance. The study found a substantial positive correlation between savings, demand, calls, and term deposits and bank performance in Kenya.

H_6: Deposit diversification has a significant effect on the financial stability and efficiency of commercial banks.

[46] studied the impact of intellectual capital on the financial performance and stability of 32 banks in Ghana. The study provides evidence supporting the assertion that VAIC™ has a beneficial and substantial effect on both financial performance and financial stability. [46] analysed the influence of intellectual capital and its sub-components on the efficiency indicators of 38 Indian banks listed on the stock exchange. The research results endorse the need for increased investment in intellectual assets to enhance banking efficiency and value creation in India. Human capital has a substantial positive influence on the performance of banks, highlighting the importance of knowledge-based assets for service-oriented institutions [47]. Diversification has a detrimental effect on cost efficiency, financial stability, and profitability. However, the detrimental impact of diversification is mitigated with increased human capital efficiency [10].

H_7: Intellectual capital has a significant effect on the financial stability and efficiency of commercial banks

Data and Methodology

In this study, a descriptive and explanatory research design with a quantitative research approach was employed to analyse the relationships between the independent variables of bank diversification that affect the financial stability and efficiency of the banking sector in Ethiopia. As of late 2022, the total number of banks in Ethiopia reached 32, comprising 1 central bank, 1 development bank, 1 public commercial bank and 29 privately owned commercial banks[48] its impact on the financial performance of banks remains inconclusive. This paper explores the relationship between financial inclusion and the financial performance of commercial banks in Ethiopia, using a sample of 16 banks. We analyse 10 years of data (2013–2022. Although Ethiopia has a total of 32 operating banks, only 17 banks met the criteria of our sample throughout the study period. The secondary data for this study were obtained from the audited financial accounts of 17 Ethiopian commercial banks. These 17 banks are composed of one public and 16 private commercial banks. There is only one public commercial bank in the country while the rest are privately owned banks. All 12 remaining banks had been operating over a timeframe of less than 10 years (most of them since 2022). These banks were excluded from the sample because their financial performance would create outliers, biasing the regression result. The selected institutions were commercial banks with sufficient data availability to run the regression analysis and at least ten years old.

Description and Measurement of Variables

Independent Variable

Diversification has been defined differently according to the situation and context in which it is used. For this study, the term diversification refers to a strategy that spreads an investment across several assets, geographical locations, income sources, and sectoral and deposit schemes to reduce risk and enhance the financial stability and efficiency of banks [49; 10; 12] diversification for different banking business schemes is measured using the Herfindahl–Hirschman index (HHI). The index is calculated by adding up the squares of individual exposures and dividing this amount by the overall exposure within a specific categorization [9].

Dependent Variables

The dependent variables in this study are bank financial stability and efficiency. Efficiency is the ability of banks to maximize their returns at a minimum cost of operation. Bank stability refers to the risk-adjusted net of tax returns achieved at the end of each fiscal year [50this research investigates the ID relationship with bank stability. Drawing on the dynamic resource-based view and modern portfolio theory, this research examines the influence of a paramount internal factor i.e. bank life cycle or bank maturity on income diversification (ID; 10].

Table 1. Summary of Variable Descriptions and Measurements

Classification	Notation	Measurement
Bank stability	*RAROA*	$\frac{ROA}{Standard\ Deviation\ of\ ROA}$
	RAROE	$\frac{ROE}{Standard\ Deviation\ of\ ROE}$
	Z-score	$\frac{EQTA + ROA}{Standard\ deviation\ of\ ROA}$
Cost efficiency	*CTIR*	$\frac{Operating\ Expense}{Operating\ Income}$
Geographic diversification	*GD*	Logarithm of the number of branch networks
Income diversification	*ID*	$1-(\frac{Interest\ income}{Total\ Income}+\left(\frac{Non-Interest\ Income}{Total\ \ income}\right)2$
Asset diversification	AD	$1-\left(\frac{Loans}{Total\ Assets}\right)2+\left(\frac{Non-Loan\ assets}{Total\ Assets}\right)2$
Investment diversification	INVD	$1-\left(\frac{Financial\ assets}{Total\ Investments}\right)2+\left(\frac{Other\ investments}{Total\ investments}\right)2$
Sectoral credit diversification	SD	$1-\left(\frac{Mfg.}{Total\ Credit}\right)+\left(\frac{Export}{Total\ Credit}\right)2+\left(\frac{Dom.Trade}{Total\ Credit}\right)2+ +\left(\frac{Build\ \&const.}{Total\ Credit}\right)2+\left(\frac{Others}{Total\ Credit}\right)2$
Deposit diversification	DD	$1-\left(\frac{Saving\ deposit}{Total\ Deposit}\right)2+\left(\frac{Demand\ Deposit}{Total\ Deposit}\right)2+\left(\frac{Fixed\ Deposit}{Total\ Deposit}\right)2$
Intellectual capital efficiency	VAIC	HCE + SCE +CEE
Capital adequacy ratio	CAR	The ratio of owners' capital to total assets
Loan deposit ratio	LDR	The ratio of total loans to total deposits
Nonperforming loan	NPL	The ratio of nonperforming loans to total outstanding loan
Bank size	BS	Log of total assets
Ownership	OW	Dummy: 1=public, 0=private

Source: authors' computations.

Model Specification

This study used a seemingly unrelated regression (SURE) estimation method to examine the effects of bank diversification on Ethiopian commercial banks' financial stability and efficiency, considering intellectual capital efficiency and other control variables, to address endogeneity issues. The data analysis was conducted using STATA Version 15. Three-stage list square estimation is a method that efficiently estimates and addresses endogeneity, heteroskedasticity, and autocorrelation among variables. In addition, where there is endogeneity bias and the structural equation model is correctly specified, the 3SLS method provides more reliable and precise coefficient estimates than the 2SLS method [51]. The rationale for using this estimation method is to consider the endogeneity among diversification, financial stability, and bank efficiency. The literature shows that financial stability, measured by risk-adjusted return on assets (RAROA), risk-adjusted return on equity (RAROE), and banks' Z-scores, has an endogeneity problem with efficiency [19]. In addition, bank-specific variables may not be entirely exogenous to the measures of bank financial stability and efficiency [52]. Year dummies are not incorporated into the econometrics model because no major structural

changes have occurred, particularly during COVID-19. To boost bank liquidity and debt relief, the national bank of Ethiopia injected 15 billion Ethiopian birr into commercial banks to ensure that banks have enough liquidity to provide relief and working capital to businesses and households. Hence, the following simultaneous equation is formulated for the dependent and independent variables:

$$RAROA = \alpha_0 + \alpha_1 CTIR_{it} + \alpha_2 RAROA_{it-1} + \alpha_3 ID_{it} + \alpha_4 GD_{it} + \alpha_5 AD_{it} + \alpha_6 INVD_{it} + \alpha_7 SD_{it} + \alpha_8 DD_{it} + \alpha_9 VAIC_{it} + \alpha_{10} CAR_{it} + \alpha_{11} LDR_{it} + \alpha_{12} NPL_{it} + \alpha_{13} BS_{it} + \alpha_{14} OW_{it} + \mu_i; (1)$$

$$CTIR = \beta_0 + \beta_1 RAROE_{it} + \beta_2 ID_{it} + \beta_3 GD_{it} + \beta_4 AD_{it} + \beta_5 INVD_{it} + \beta_6 SD_{it} + \beta_7 DD_{it} + \beta_8 VAIC_{it} + \beta_9 CAR_{it} + \beta_{10} LDR_{it} + \beta_{11} NPL_{it} + \beta_{12} BS_{it} + \beta_{13} OW_{it} + \varepsilon_i; (2)$$

$$RAROE = \lambda_0 + \lambda_1 RAROE_{it-1} + \lambda_2 ID_{it} + \lambda_3 GD_{it} + \lambda AD_{it} + \lambda_5 INVD_{it} + \lambda_6 SD_{it} + \lambda_7 DD_{it} + \lambda_8 VAIC_{it} + \lambda_9 CAR_{it} + \lambda_{10} LDR_{it} + \lambda_{11} NPL_{it} + \lambda_{12} BS_{it} + \lambda_{13} OW_{it} + \acute{e}_i; (3)$$

$$Z\text{-}score = \delta_0 + \delta_1 ZScoreit\text{-}1 + \delta_2 CTIR_{it} + \delta_3 ID_{it} + \delta_4 GD_{it} + \delta_5 AD_{it} + \delta_6 INVD_{it} + \delta_7 SD_{it} + \delta_8 DD_{it} + \delta_9 VAIC_{it} + \delta_{10} CAR_{it} + \delta_{11} LDR_{it} + \delta_{12} NPL_{it} + \delta_{13} BS_{it} + \delta_{14} OW_{it} + \grave{u}_i, (4)$$

where the risk-adjusted return on assets (*RAROA*), the risk-adjusted return on equity (*RAROE*), and the Z-score are alternative measures of financial stability. The cost-to-income ratio (*CTIR*) is a measure of bank efficiency. α_0, β_0, λ_0, and δ_0 are the intercepts, while α_0– α_{14}, β_1–β_{13}, λ_1–λ_{13}, δ_1–δ_{14} represent coefficients for the independent and control variables. Income diversification (*ID*), geographic diversification (*GD*), asset diversification (*AD*), investment diversification (*INVD*), sectoral credit diversification (*SD*), deposit diversification (*DD*), and value-added intellectual capital (*VAIC*) are predictors of financial stability and efficiency. *CAR, LDR, NPL, BS*, and *OW* are bank-specific controls representing the capital adequacy ratio, loan deposition ratio, nonperforming loan, bank size, and ownership structure. $RAROA_{it-1}$, $RAROE_{it-1}$, and $ZScore_{it-1}$ are the lag of the alternative financial stability proxies. *i* represents a specific bank, while *t* represents time. μ_i, ε_i, $\acute{e}_i$, $\grave{u}_i$ denote the error terms.

Results and Discussion

Descriptive Statistics

Table 2 presents summary statistics for the study's primary variables, including the financial stability proxies *RAROA* and *RAROE* and the Z-score of Ethiopian banks, which have averages of 5.046, 4.77, and 5.059 for the study period, with standard deviations of 1.895, 1.754, and 2.776, respectively. This finding indicates that commercial banks' financial stability proxy variables differ. The cost-to-income ratio (*CTIR*), a proxy for bank efficiency, has an average value of 0.541 and a standard deviation of 0.094. Geographic diversification, income diversification, asset diversification, investment diversification, sectoral credit diversification, and deposit diversification have average values of 4.986, 0.439, 0.472, 0.322, 0.684, and 0.544, respectively, with standard deviations of 1.095, 0.065, 0.032, 0.093, 0.142, and 0.057, respectively.

Table 2. Descriptive Statistics of the Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
RAROA	170	5.046	1.895	2.125	9.759
RAROE	170	4.77	1.754	.821	10.393
CTIR	170	.541	.094	.282	.861
Zscore	170	5.059	2.776	-1.851	12.834
GD	170	4.986	1.095	2.061	7.539
ID	170	.439	.065	.141	.5
AD	170	.472	.032	.365	.5
INVD	170	.322	.093	.056	.479
SD	170	.684	.142	.239	.795
DD	170	.544	.057	.399	.665
VAIC	170	4.14	.68	3.224	6.434
BS	170	7.24	.612	5.58	9.079
CAR	170	.137	.047	.037	.297
LDR	170	.672	.127	.319	1.045
NPL	170	.022	.015	0	.088
OW	170	.059	.236	0	1
RAROAit-1	170	5.953	3.471	.271	17.23
RAROEit-1	170	4.837	2.773	-1.73	13.377
Zscoreit-1	170	5.121	2.752	-1.851	12.834

Source: authors' estimates.

These diversity proxy variables are measured by the Herfindahl – Hirschman index (HHI), except for geographic diversification, which is determined by the log of the number of branches. The HHI ranges from 0.00 (complete concentration), through 0.38 (little diversification) to 0.75 (complete diversification or an equitable split among the portfolio categories). A lower HHI number suggests less diversification and vice versa [10].

Hence, banks' level of diversification in income, assets, sectoral credit, and deposit schemes as per the HH index is low, and there is no diversification in their investment portfolios. Among these variables, sectoral credit diversification has the highest score, followed by deposit diversification, implying that banks diversify their credit facilities for various sectors and provide different deposit services. In addition, intellectual capital efficiency has a mean score of 4.152 and a standard deviation of 0.759, indicating differences among the banks. Among the bank-specific control variables, bank size has a mean value of 7.234 and a standard deviation of 0.62, indicating a difference in size between banks.

Test of Multicollinearity

According to [53], a correlation coefficient between two regressors greater than 0.8 indicates a severe multicollinearity problem. Conversely, if a variable's variance inflation factor (VIF) is greater than 10, the coefficient of determination (R2) is above 0.90, indicating a high level of collinearity for that variable. Nevertheless, the highest correlation between the explanatory factors is lower than the commonly accepted guideline. Furthermore, the variance inflation factor (VIF) test corroborates this finding. Therefore, multicollinearity is not a significant concern for this investigation.

This study uses a seemingly unrelated regression (SURE) estimation method to examine the effects of bank diversification on the financial stability and efficiency of commercial banks in Ethiopia. The model's dependent variables are *RAROA, RAROE*, and the *Z-score*, as well as the cost-to-income ratio (*CTIR*) – a measure of bank efficiency. The model also includes explanatory variables for diversification measures, such as geographic diversification (*GD*), income diversification (*ID*), asset diversification (*AD*), investment diversification (*INVD*), sectoral credit diversity (*SD*), deposit diversification (*DD*), and intellectual capital efficiency. Bank-specific control variables such as bank size, total assets, capital adequacy ratio, and loan deposit ratio are also considered. The variables of financial stability and efficiency are considered endogenous. The parameters are estimated using the coefficients enclosed in brackets. *Statistical significance with a p-value of 0.10. **Statistical significance with a p-value of 0.05. ***Statistical significance with a p-value of 0.01.

Diversification and Financial Stability Nexus

The regression result revealed that geographic diversification (GD), asset diversification (AD), sectoral credit diversification (SD), and intellectual capital efficiency (VAIC), as demonstrated in Table 2, have a significantly positive influence on bank financial stability as measured by the risk-adjusted return on assets (RAROA). This suggests that, as banks' diversification of these schemes and intellectual capital efficiency increase, their financial stability is enhanced, as evaluated by a risk-weighted measure of return on assets. The findings of this study are compatible with those of [19; 38; 54]. However, they contradict those of [10], which found that diversification negatively affects banks' financial stability and efficiency. At the same time, investment diversification (INVD) in financial assets and other investments has a statistically significant negative impact on this variable. While income and deposit diversification positively affect this financial stability indicator, the effect is not statistically significant. The endogenous cost-to-income ratio variable has a major detrimental impact on financial stability. These findings indicate that banks with greater cost-effectiveness tend to have greater financial stability, as assessed by risk-weighted returns on assets.

Their heterogeneous orientation notwithstanding, all bank-specific control factors significantly impact financial stability, as evaluated by risk-adjusted return on assets. The capital adequacy ratio has a notable negative impact, whereas bank size, loan deposit ratio, and ownership structure exhibit statistically significant negative effects. This study leads to the startling finding that nonperforming loans benefit financial stability, although this effect is not statistically significant.

However, most of the explanatory and control factors were determined to be statistically insignificant when considering other indicators of financial stability, the risk-adjusted return on equity (*RAROE*), and the *Z-score* of banks despite exhibiting both positive and negative trends. More precisely, geographic diversification, investment diversification, sectoral credit diversification, and intellectual capital efficiency positively impact financial stability measures. Nonetheless, asset diversification negatively affects both financial stability measures. Income diversification negatively affects the risk-adjusted return on equity yet has a positive effect on bank *Z-scores*. Geographic diversification significantly affects the risk-adjusted return on equity (*RAROE*) and banks' *Z-scores*. On the other hand, asset diversification has a significant negative effect on the return on equity, while investment diversification has a significant positive effect on the *Z-score*.

Furthermore, intellectual capital efficiency significantly and positively impacts the *Z-score* and risk-adjusted return on equity. Similarly, although the bank-specific control variables show mixed results, they do not have a statistically significant effect except for bank size, which significantly and negatively affects risk-adjusted return on equity. Finally, the lagged values of the financial stability indicators, including the risk-adjusted return on assets (*RAROA*), the risk-adjusted return on equity (*RAROE*), and the *Z-score*, demonstrated a notably positive influence.

Table 3. Seemingly Unrelated Regression (SURE) Results for the Full Sample

VARIABLES	(1) RAROA	(2) CTIR	(3) RAROE	(4) Zscore
CTIR	-7.922***			-5.428***
	(0)			(1.14e-06)
$RAROA_{it-1}$	0.308***			
	(0)			
GD	1.305***	0.0242*	0.508*	0.491**
	(4.58e-07)	(0.0864)	(0.0563)	(0.0367)
ID	1.544	-0.105	-0.976	0.825
	(0.306)	(0.206)	(0.538)	(0.546)
AD	13.24***	0.478***	-5.337*	-1.266
	(2.31e-05)	(0.00403)	(0.0931)	(0.655)
INVD	-2.774*	-0.0354	1.789	3.646**
	(0.0974)	(0.687)	(0.283)	(0.0138)
SD	3.127***	0.276***	0.810	0.989
	(0.000170)	(8.21e-11)	(0.315)	(0.188)
DD	2.219	0.179*	2.548	-0.559
	(0.241)	(0.0870)	(0.198)	(0.744)
VAIC	0.529**	-0.0363***	0.636***	0.338*
	(0.0167)	(0.00195)	(0.00361)	(0.0884)
BS	-1.379***	-0.0494**	-0.911**	-0.249
	(0.00213)	(0.0352)	(0.0449)	(0.523)
CAR	9.414***	0.289*	4.500	1.547
	(0.00118)	(0.0742)	(0.147)	(0.566)
LDR	-2.021**	0.0359	1.091	-0.367
	(0.0335)	(0.489)	(0.268)	(0.666)
NPL	8.030	1.532***	3.983	-4.130
	(0.226)	(1.01e-05)	(0.546)	(0.485)
OW	-3.028***	-0.00936	-0.514	-0.703
	(0.000178)	(0.832)	(0.543)	(0.333)
RAROE		-0.0272***		
		(0)		
$RAROE_{it-1}$			0.328***	
			(0)	
$Zscore_{it-1}$				0.747***
				(0)
Constant	-0.524	0.507***	3.644	0.984
	(0.884)	(0.00660)	(0.322)	(0.754)
Observations	170	170	170	170
R-squared	0.647	0.559	0.547	0.861
Chi^2	347.40***	266.83***	196.15***	1111.23***

p-value in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' estimates.

Diversification and Bank Efficiency

This study used the cost-to-income ratio, which represents the relationship between operating expenses and operating income, as a measure of efficiency. As the value of this ratio increases, banks become less cost-effective. The regression analysis in Table 4 above examines the relationships between the dependent variable, bank efficiency, and the independent variables, which include diversification proxy factors, intellectual capital efficiency, and bank-specific control variables.

This study found that geographic, asset, and sectoral credit diversification positively and significantly impacts the dependent variable of the cost-to-income ratio. An increase in these diversification strategies increases the cost-to-income ratio, implying that banks will become less cost-efficient as their diversity increases through these schemes. These findings are consistent with those of [10] and [55], whose findings are that diversification reduces banks' efficiency. On the other hand, [20] reported that asset and income diversification have mixed effects on the efficiency of US banks.

Deposit diversification improves the cost-to-income ratio in a positive yet statistically insignificant way. In contrast, income diversification and investment diversification negatively affect the dependent variable. This implies that while these variables can potentially improve cost efficiency, their impact is statistically inconsequential. This finding contradicts the results of [56] that revenue and funding source diversification are negatively associated with the efficiency of banks.

On the other hand, intellectual capital efficiency has a significantly positive effect on the dependent variable. Increased intellectual capital efficiency improves the cost efficiency of commercial banks. In this model, the endogenous variable risk-adjusted return on equity (*RAROE*) considerably and positively affects the cost-to-income ratio. Banks' cost efficiency improves when their profitability increases, as measured by the risk-weighted return on equity. The bank-specific control variable bank size has a substantial positive effect on the efficiency of banks. The reverse capital adequacy ratio and nonperforming loans have a significant impact on reducing efficiency. However, the loan deposit ratio and ownership structure do not substantially impact the efficiency of commercial banks in Ethiopia. As a result, hypotheses H_1, H_3, H_4, H_5, and H_7 accepted that geographic, asset, and sectoral diversification and intellectual capital substantially enhance financial stability measured by the risk-adjusted returns on assets, and hypotheses H_2 and H_6 are rejected. While investment diversification significantly negatively affects risk-adjusted returns on assets, it has a positive and significant impact on the Z-score. However, geographic, asset, sectoral, and deposit diversification have negative effects on efficiency. Hence, hypotheses H_1, H_3, H_5, and H_6 are accepted, while H_2 and H_4 are rejected. In contrast intellectual capital has a significantly positive effect on banks' efficiency, and hypothesis H_7 is accepted.

Table 4. Seemingly Unrelated Regression (SURE) Results for Sample Split by Ownership

VARIABLES	(1) RAROA	(2) CTIR	(3) RAROE	(4) Zscore
CTIR	-8.767***			-5.627***
	(0)			(8.62e-07)
$RAROA_{it-1}$	0.316***			
	(0)			
GD	1.470***	0.0296**	0.495*	0.562**
	(1.55e-08)	(0.0395)	(0.0723)	(0.0207)
ID	1.576	-0.0708	-0.882	0.731
	(0.295)	(0.404)	(0.590)	(0.604)
AD	11.80***	0.574***	-2.597	-3.194
	(0.000343)	(0.00131)	(0.454)	(0.303)
INVD	-2.766*	-0.00773	1.885	3.568**
	(0.0985)	(0.931)	(0.271)	(0.0190)
SD	2.975***	0.250***	0.839	1.023
	(0.000399)	(2.01e-08)	(0.327)	(0.192)
DD	2.041	0.142	2.675	-0.299
	(0.277)	(0.181)	(0.189)	(0.865)

VARIABLES	(1) RAROA	(2) CTIR	(3) RAROE	(4) Zscore
VAIC	0.567***	-0.0311***	0.665***	0.372*
	(0.00996)	(0.00959)	(0.00333)	(0.0685)
BS	-1.820***	-0.0715***	-0.797	-0.328
	(0.000136)	(0.00458)	(0.111)	(0.445)
CAR	8.100***	0.112	4.456	1.973
	(0.00908)	(0.523)	(0.197)	(0.509)
LDR	-1.822	0.100	1.203	-0.769
	(0.101)	(0.101)	(0.310)	(0.454)
NPL	5.576	1.308***	4.867	-4.950
	(0.402)	(0.000290)	(0.484)	(0.420)
RAROE		-0.0266***		
		(0)		
RAROEit1			0.305***	
			(0)	
Zscore				
$Zscore_{it-1}$				0.742***
				(0)
Constant	3.050	0.569***	1.337	2.251
	(0.405)	(0.00324)	(0.730)	(0.496)
Observations	160	160	160	160
R-squared	0.661	0.529	0.497	0.858

p-value in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' estimates.

Robustness Tests

In this section, we perform sensitivity analysis to assess the baseline sample result's robustness.

Initially, we segregated the data into two primary categories according to ownership. Banks are categorized into private-sector banks and public-sector banks. As indicated in Table 4, regression analysis is performed on private banks individually using the three-stage seemingly unrelated regression, which is the same procedure used in the baseline sample. Due to the limited number of observations, we are unable to do regression analysis for a public sector bank. Our sample consists of only one public sector bank, which has a single observation for a period of 10 years. Therefore, as shown in Table 3, a consistent outcome is achieved when private sector banks are utilized as a sub-sample.

Conclusion

The literature explores the conflicting impacts of diversity on commercial banks' financial stability and efficiency. This study examines the effects of bank diversity on financial stability, efficiency, and intellectual capital efficiency while considering other bank-specific control factors. Seemingly unrelated regression (SURE) is employed to address the endogeneity bias in the model, where the variables of financial stability and efficiency are treated as endogenous. The study revealed that geographic diversification, asset diversification, sectoral credit diversification, and intellectual capital efficiency significantly impact the financial stability of banks, as assessed by risk-adjusted return on assets (*RAROA*). Income and deposit diversification have a modest positive impact. In contrast, investment diversification has a significant negative effect on the risk-adjusted return on assets yet a significant positive effect on banks' *Z-scores*. Banks with greater cost-effectiveness tend to have greater financial stability. The control variables of bank size, loan deposit ratio, and ownership structure substantially improve financial stability.

Geographic diversification, asset diversification, sectoral credit, and deposit diversification negatively impact banks' efficiency. In contrast, intellectual capital efficiency has a significant positive effect on the dependent variable. While

income and investment diversification have a slight positive impact, bank size substantially enhances bank efficiency. However, the capital adequacy ratio and nonperforming loans have a significant impact on reducing efficiency. The results of this study provide valuable insights. Bank managers can better understand the impact of diversification on banks' financial stability and efficiency. Policymakers and the top management of respective banks are thus encouraged to pursue strategic geographic, asset, and sectoral credit portfolio diversification to maintain their financial stability and efficiency. To the best of our knowledge, this is one of the rare studies to investigate the effect of diversification on the financial stability and efficiency of commercial banks in Ethiopia. It uses a narrow time frame of ten years and includes control factors particular to banks. This can be regarded as a significant limitation of this study. Future studies could use extended-term yearly observations and include control factors related to macroeconomic conditions and market structure.

References

1. Cole H.L. Overview of the Financial System. *Finance and Financial Intermediation: A Modern Treatment of Money, Credit, and Banking*. New York; 2019:3-13. https://doi.org/10.1093/oso/9780190941697.003.0001
2. Ndako U.B. Financial Development and Economic Growth : Evidence from Nigeria. *The IUP Journal of Financial Economics*. 2010;8(4):37–58.
3. A. Song, C. Basu, and D. Hale, "The Evolution of the COSO Internal Control – Integrated Framework".
4. OECD. *The Role of Banks, Equity Markets and Institutional Investors in Long-Term Financing for Growth and Development. Report for G20 Leaders*. 2013. 44 p. (accessed on 13.04.2025) URL: https://www.oliverwyman.com/content/dam/oliver-wyman/global/en/files/archive/2013/The-Role-of-Banks-Equity-Markets-and-Institutional-Investors-in-Long-Term-Financing-for-Growth-and-Development.pdf
5. Weisbrod S.R., Rojas-Suárez L. Role of Banks in Developing Countries. In: Weisbrod S.R., Rojas-Suárez L. *Financial Fragilities in Latin America*. International Monetary Fund; 1995. 78 p. https://doi.org/10.5089/9781557755025.084
6. Eken M.H., Selimler H., Kale S. et al. The effects of global financial crisis on the behaviour of European banks: A risk and profitability analysis approach. *ACRN Oxford Journal of Finance and Risk Perspectives*. 2018;7(1–2):48–73. (accessed on 13.04.2025) URL: https://www.acrn-journals.eu/resources/jofrp0701d.pdf
7. Wyss L. *Essays on bank income diversification. (Thesis)*. Bern: Universität Bern; 2018. (accessed on 13.04.2025) URL: https://boristheses.unibe.ch/id/eprint/820
8. Hazzi O.A., Al Kilani M.I. The Financial Performance Analysis of Islamic and Traditional Banks: Evidence from Malaysia. *European Journal of Economics, Finance and Administrative Sciences*. 2013;(57):133–144.
9. Turkmen S.Y., Yigit I. Diversification in Banking and its Effect on Banks' Performance: Evidence from Turkey. *American International Journal of Contemporary Research*. 2012;2(12):111–119. (accessed on 13.04.2025) URL: https://openaccess.marmara.edu.tr/server/api/core/bitstreams/000588e4-2577-4085-9f64-c9aa1a0962c0/content
10. Adesina K.S. How diversification affects bank performance: The role of human capital. *Economic Modelling*. 2021;94:303–319. https://doi.org/10.1016/j.econmod.2020.10.016
11. Ndungu J., Muturi W. Effect of Diversification on Financial Performance of Commercial Banks in Kenya. *International Journal of Current Aspects*. 2019;3(V):267-285. https://doi.org/10.35942/ijcab.v3iV.67
12. Ngware S.G., Olweny T., Muturi W. Do Bank Size Moderate Relationship between Banks' Portfolio Diversification and Financial Performance of Commercial Banks in Kenya? *SEISENSE Journal of Management*. 2020;3(2):14–30. https://doi.org/10.33215/sjom.v3i2.261
13. Bezabeh A., Desta A. Banking Sector Reform in Ethiopia. *International Journal of Business and Commerce*. 2014:3(8). (accessed on 13.04.2025) URL: https://scholar.dominican.edu/all-faculty/96
14. *History of Banking in Ethiopia*. (accessed on 13.04.2025) URL: https://nbe.gov.et/about-us/our-history/
15. Hailu A.A., Tassew A.W. The impact of investment diversification on financial performance of commercial banks in Ethiopia. *Studii Financiare (Financial Studies)*. 2018;22(3):41-55. (accessed on 13.04.2025) URL: https://www.econstor.eu/handle/10419/231666
16. Kenny G. *Diversification Strategy: How to Grow a Business by Diversifying Successfully*. Kogan Page; 2009. 224 p.
17. Wagner W. *Diversification at financial institutions and systemic crises*. 2006: 2006–71. (accessed on 13.04.2025) URL: https://repository.tilburguniversity.edu/server/api/core/bitstreams/4f8268ef-eb22-4636-902c-764fd4a20749/content
18. Wagner W. Diversification at financial institutions and systemic crises. *Journal of Financial Intermediation*. 2010;19(3):373-386. https://doi.org/10.1016/j.jfi.2009.07.002

19. Amidu M., Wolfe S. Does bank competition and diversification lead to greater stability? Evidence from emerging markets. *Review of Development Finance.* 2013;3(3):152–166. https://doi.org/10.1016/j.rdf.2013.08.002

20. Khan A., Hassan M.K., Maroney N., et al. Efficiency, diversification, and performance of US banks. *International Review of Economics & Finance.* 2020;67:101–117. https://doi.org/10.1016/j.iref.2019.12.010

21. Boamah N.A., Boakye-Dankwa A., Opoku E. Risk-taking behavior, competition, diversification and performance of frontier and emerging economy banks. *Asian Journal of Economics and Banking.* 2022;6(1):50–68. https://doi.org/10.1108/ajeb-04-2021-0047

22. Berger A.N., Hasan I., Zhou M. The effects of focus versus diversification on bank performance: Evidence from Chinese banks. *Journal of Banking & Finance.* 2010;34(7):1417–1435. https://doi.org/10.1016/j.jbankfin.2010.01.010

23. Oladimeji M.S., Udosen I. The Effect of Diversification Strategy on Organizational Performance. *Journal of Competitiveness.* 2019;11(4):120–131. https://doi.org/10.7441/joc.2019.04.08

24. Ooko J.O., Karugu W. Effect of Competitive Strategies on Financial Performance of Commercial Banks in Kenya. *Journal of International Business, Innovation and Strategic Management.* 2020;4(3):31-54. (accessed on 13.04.2025) URL: https://www.jibism.org/core_files/index.php/JIBISM/article/view/136

25. Ciocchetta F. Asset diversification and banks' market value. *Notes on Financial Stability and Supervision.* 2020;20:17p. (accessed on 13.04.2025) URL: https://www.bancaditalia.it/pubblicazioni/note-stabilita/2020-0020/eng_Notes_on_Financial_Stability_and_Supervision_No_20.pdf?language_id=1

26. Mohsin H.J., Hani L.Y.B., Atta A.A.B., et al. The Impact of Digital Financial Technologies on the Development of Entrepreneurship: Evidence From Commercial Banks in the Emerging Markets. *Corporate & Business Strategy Review.* 2023;4(2):304–312. https://doi.org/10.22495/cbsrv4i2siart10

27. Sharma D. India's Leapfrogging Steps from Bricks-and-Mortar to Virtual Banking. Prospects and Perils. *The IUP Journal of Management Research.* 2009;8(3):45–61.

28. Sharma D. Does Technology Lead to Better Financial Performance? A Study of Indian Commercial Banks. *Managing Global Transitions.* 2012;10(1):3–28. (accessed on 13.04.2025) URL: https://www.fm-kp.si/zalozba/ISSN/1581-6311/10_003-028.pdf

29. Elsas R., Hackethal A., Holzhäuser M. The anatomy of bank diversification. Journal of Banking & Finance. 2010;34(6):1274–1287. https://doi.org/10.1016/j.jbankfin.2009.11.024

30. The same as 22

31. Goetz M.R., Laeven L., Levine R. Identifying the Valuation Effects and Agency Costs of Corporate Diversification: Evidence from the Geographic Diversification of U.S. Banks. *The Review of Financial Studies.* 2013;26(7):1787-1823. https://doi.org/10.1093/rfs/hht021

32. Mulwa J.M., Kosgei D. Commercial Bank Diversification and Financial Performance: The Moderating Role of Risk. *Journal of Finance and Investment Analysis.* 2016;5(2):31-52.

33. The same as 11

34. Subramaniam V., Wasiuzzaman S. Geographical diversification, firm size and profitability in Malaysia: A quantile regression approach. *Heliyon.* 2019;5(10):e02664. https://doi.org/10.1016/j.heliyon.2019.e02664

35. Doerr P., Schaz S. Geographic diversification and bank lending during crises. *Journal of Financial Economics.* 2021;140(3):768-788. https://doi.org/10.1016/j.jfineco.2021.02.004

36. Gurbuz A.O., Yanik S., Ayturk Y. Income Diversification and Bank Performance: Evidence From Turkish Banking Sector. *Journal of BRSA Banking and Financial Markets.* 2013;7(1):9–29. (accessed on 13.04.2025) URL: http://www.bddk.org.tr/Content/docs/bddkDergiTr/dergi_0013_03.pdf

37. Foster S., Bailey S. *Does Revenue and Loan Portfolio Diversification Improve Bank Performance & Stability? Evidence from Jamaican Commercial Banks.* 2015. 37 p. (accessed on 13.04.2025) URL: https://e2gobqetsqs.exactdn.com/wp-content/uploads/2019/10/Does_Revenue_and_Loan_Portfolio_Diversification_Improve_2015.pdf

38. Chu S.-H., Li S., Xia X., et al. Bank Diversification and Performance. The Role of Financial Stability. *Advances in Economics, Business and Management Research.* 2021;178:38–43. https://doi.org/10.2991/aebmr.k.210601.007

39. Uddin M.J., Majumder M.T.H., Akter A., et al. Do the diversification of income and assets spur bank profitability in Bangladesh? A dynamic panel data analysis. *Vilakshan - XIMB Journal of Management.* 2022;19(2):177–194. https://doi.org/10.1108/xjm-01-2021-0023

40. Chen N., Liang H.Y., Yu M.T. Asset diversification and bank performance: Evidence from three Asian countries with a dual banking system. *Pacific-Basin Finance Journal.* 2018;52:40–53. https://doi.org/10.1016/j.pacfin.2018.02.007

41. Edirisuriya P., Gunasekarage A., Perera S. Product

diversification and bank risk: evidence from South Asian banking institutions. *Applied Economics*. 2019;51(5):444–464. https://doi.org/10.1080/00036846.2018.1489516

42. *The Impact of Natural Hazards and Disasters on Agriculture and Food and Nutritions Security: A Call for Action to Build Resilien*. 2015. (accessed on 13.04.2025) URL: https://openknowledge.fao.org/server/api/core/bitstreams/a9b93dc0-9b13-4644-96d0-fd8879e66007/content

43. Duho K.C.T., Onumah J.M., Owodo R.A. Bank diversification and performance in an emerging market. *International Journal of Managerial Finance*. 2020;16(1):120–138. https://doi.org/10.1108/IJMF-04-2019-0137

44. Rop M.K., Bokongo J., Yusufkibe D. Effect of investment Diversification on the Financial Performance of Commercial Banks in Kenya. *IOSR Journal of Business and Management*. 2016;18(11):102–115. (accessed on 13.04.2025) URL: https://www.iosrjournals.org/iosr-jbm/papers/Vol18-issue11/Version-1/O181101102115.pdf

45. Acharya V.V., Hasan I., Saunders A. Should banks be diversified? Evidence from individual bank loan portfolios. *The Journal of Business*. 2006;79(3):1355-1412. https://doi.org/10.1086/500679

46. Ngware S.G. Banks' *Portfolio Diversification on Financial Performance of Commercial Banks in Kenya*: doctor of philosophy (Finance). Jomo kenyatta university of agriculture and technology. 2021. (accessed on 13.04.2025) URL: http://ir.jkuat.ac.ke/bitstream/handle/123456789/5640/Ngwareyyu%2C%20Stephen%20Githaiga%20PHD%20Finance%2C%202021.pdf?sequence=1&isAllowed=y

47. Duho K.C.T., Onumah J.M. Bank diversification strategy and intellectual capital in Ghana: an empirical analysis. *Asian Journal of Accounting Research*. 2019;4(2):246-259. https://doi.org/10.1108/AJAR-04-2019-0026

48. Githaiga P.N. Human capital, income diversification and bank performance–an empirical study of East African banks. *Asian Journal of Accounting Research*. 2021;6(1):95-108. https://doi.org/10.1108/AJAR-06-2020-0041

49. Ayele A.B., Malhotra K., Sharma M. Financial Inclusion and Bank Performance: Evidence from the Banking Sector in Ethiopia. *Journal of Corporate Finance Research = Korporativnye finansy*. 2025;19(1):54-69. https://doi.org/10.17323/j.jcfr.2073-0438.19.1.2025.54-69

50. Cheung J. *How we Invest' white paper: Diversification*. 2014. (accessed on 13.04.2025) URL: https://www.nzsuperfund.co.nz

51. Tariq W., Usman M., Tariq A., et al. Bank maturity, income diversification, and bank stability. *Journal of Business Economics and Management*. 2021;22(6):1492-1511. https://doi.org/10.3846/jbem.2021.15583

52. Zellner A., Theil H. Three-Stage Least Squares : Simultaneous Estimation of Simultaneous Equations. *Econometrica*. 1962;30(1):54–78. https://doi.org/10.2307/1911287

53. Chandramohan K., Lunawat C.D., Lunawat C.A. The impact of diversification on bank stability in India. *Cogent Business & Management*. 2022;9(1):2094590. https://doi.org/10.1080/23311975.2022.2094590

54. Gujarati D.N., Porter D.C. *Basic Econometrics*, 5th ed. The McGraw-Hill; 2009. 946 p.

55. Adem M. Impact of income diversification on bank stability: a cross-country analysis. *Asian Journal of Accounting Research*. 2023;8(2):133-144. https://doi.org/10.1108/AJAR-03-2022-0093

56. Hu W. *The impact of regulation, governance, market power and diversification on bank performance and risk*. University of Sussex; 2018. (accessed on 13.04.2025) URL: https://hdl.handle.net/10779/uos.23461253.v1

57. Jeon B.N., Wu J. Chen L., et al. Diversification, efficiency and risk of banks: New consolidating evidence from emerging economies. *Hong kong institute for monetary and financial research*. 2020:Working Paper No.14/2020. https://doi.org/10.2139/ssrn.3711150

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