

The Influence of Portfolio Diversification on Financial Performance: Evidence from Listed Banks on the Ghana Stock Exchange

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DOI: <https://dx.doi.org/10.47772/IJRISS.2025.910000039>

Received: 29 September 2025; Accepted: 07 October 2025; Published: 03 November 2025

ABSTRACT

The study examines the influence of portfolio diversification on financial performance: evidence from listed Banks on the Ghana Stock Exchange. The results of this study indicate that the combined impact of the deposit portfolio, the loan portfolio, and the investment portfolio on the financial performance of the banks quoted on the Ghana Stock Exchange is statistically insignificant. Used a descriptive correlational research design and analyzed secondary data of financial statements published during eleven years (2012-2021) through solid statistical methods, including fixed effects and random effects models, together with the Hausman test, which underlines the reliability of these results. The results indicate that the highest deposit levels can harm both the performance of the ROA and the ROE, while increased loan levels have a positive influence on these metrics. On the contrary, investments do not significantly affect ROA, but have a remarkable negative impact on ROE. The study strongly recommends that the management teams of selected banks take proactive measures to ensure that the diversification of their loan portfolios is considered a wise and strategic decision. This approach is not only beneficial; It has the potential to produce a positive and significant impact on its general financial performance.

Keywords: Portfolio diversification, financial performance, returns on assets, returns on equity

INTRODUCTION

The banking industry is crucial to the growth of every economy worldwide. Adegboye, Ojeka, and Adegboye (2020) claim that financial institutions have a significant impact on the stability of any economy. The movement of money between banks, depositors, and borrowers depends on the bank acting as a middleman, according to Yuksel, Dincer, and Karakus (2020). Since it determines the next stage of an economy's growth, the sector's stability is essential. Adegboye, Ojeka, and Adegboye (2020) claim that financial institutions have a significant impact on the stability of any economy. By receiving deposits and disbursing them as loans to organizations and people who require them with interest, banks are able to operate. Since deposits frequently finance a substantial portion of the assets held by commercial banks, they are crucial to the bank's financing (Bologna, 2011). Since the majority of a commercial bank's expenses are related to interest costs, it must be able to attract deposits at reasonable rates in order to lend to its customers. Because of this, it suggests that, assuming all other factors remain the same, a bank that can raise more deposits at a lower cost will be able to offer more lending facilities in a competitive manner and, as a consequence, will generate more revenue.

This study examined the relationship between a bank's deposit holdings and its performance. Performance measurements can be discovered with quantitative or qualitative performance attributes or definitions. They provide an organization with a tool to oversee the development toward predetermined goals by outlining key indicators of organizational performance and customer satisfaction. The effectiveness of organizational efforts in achieving organizational goals can be evaluated through performance measurement. The outcomes, successes, and end products of an organization's efforts were defined as performance by Guest et al. (2003). Bank loans are described as agreements between financial organizations that lend money and various types of legal entities that borrow it with the anticipation of a future principal and interest repayment by Monokroussos and Gortsos (2020). Despite offering a wide range of services, commercial banks get the majority of their revenue and profits from lending. However, using them comes with a lot of risk. Providing credit to consumers is currently the banking

system's primary source of income; however, doing so exposes them to high credit risk and results in significant financial losses (Ozili, 2018).

Therefore, they need a strong Portfolio management system if they are to prosper. Monitoring credit, being trustworthy, and having assurance all have a positive effect on managing loan portfolios. Each of these considerations must be taken into account in the risk reduction approach (Rathore, 2020). Commercial banks offer a wide range of services, but lending accounts for the majority of their income and profitability. However, employing them involves considerable risk. The primary source of income for the banking system at present is the granting of credit to consumers, which exposes them to high credit risk and results in a sizable portion of their income being lost (Ozili, 2018). Finance managers make key financial decisions regarding investments, financing, and dividend distributions. Forgoing current expenses in favour of future consumption is a key requirement for investing to maximize wealth (Lamichhane, 2021). The primary responsibility of investment firms, which act as financial intermediaries, is to invest the money that various clients have pooled into financial instruments known as portfolios (Chepkorir, 2019). These companies transact on the financial market in bonds, stocks, money, property, and other assets to generate a profit for their investors.

Choosing which financial securities to invest in has a significant impact on the performance of investment enterprises (Kimeu, 2015). High-return investments not only guarantee the survival of these companies but also increase their credibility, attracting more investors. There has been numerous studies on investment portfolios and financial performance undertaken globally. The impact of investment portfolios on financial performance was the main topic of Ateya's (2020), Lamichhane's (2021), Kiboi and Bosire's (2022) study. The choice of the proper investment selections may not be easy; it must be realized because of information asymmetry and the fact that the actions made have an impact. It is not far from the truth that firms do use a variety of metrics to evaluate their financial success. One of the notable measures is return on equity, which assesses the returns organisations achieve relative to the equity value of the company. Return on assets is considered a reliable measure for assessing how effectively managers utilize assets to generate income. This current study employed return on assets and return on equity to establish the efficiency level of banks based on their deposits, loans, and investment portfolios. Studies conducted by Obiero (2018), Philita (2018), Chepkorir (2018), and Mutege (2016) to gauge performance in their studies

In their study on the factors affecting Kenyan commercial banks' financial performance, Ongore and Kusa (2021) found a wide range of factors that affect financial performance. These many variables include asset quality, managerial effectiveness, capital sufficiency, liquidity management, and other macroeconomic factors.

The Bank of Ghana (2022) recognised that lending may be the most significant banking activity because interest on loans is the primary source of income and cash flow for any commercial bank, which helps to maintain stability in the bank's financial performance. The banking sector has found it challenging to maintain financial performance because of Ghana's unpredictable economic performance. Commercial bank loans, both new and existing, have gotten more expensive, and some banks have even raised interest rates on loans that were previously subject to set schedules. Because interest on loans is the primary source of earnings and cash flows for any commercial bank, lending is arguably the most significant of all banking activities, according to the Bank of Ghana (2022). The Bank of Ghana also notes that lending helps maintain a bank's financial stability. The predicament necessitates the development of a successful strategy to address the bank's unsustainable long-term financial performance, which is partially dependent on the loan portfolio held. The goal of this research is to investigate the impact of loan portfolio management on the effectiveness of Ghanaian banks.

Numerous academics and researchers worldwide have focused on the impact of portfolio diversity on the financial performance of banks. For instance, Barnes and Burnie (2014) looked at the impact of bond portfolio composition and the ideal risk-return relationship on the performance of diversified industries listed on the Canadian Stock Exchange. Chepkorir (2018) evaluated the impact of portfolio diversification on the financial performance of commercial banks listed on the Nairobi Securities Exchange. Doaei (2014) conducted a study focusing on Bursa Malaysia's financial performance and diversity. Additionally, Hailu and Tassew (2018) focused on the effect of investment diversification on the financial performance of commercial banks in Ethiopia.

Most bank studies in Ghana focused on non-performing loans and the efficiency of Ghana's banks (Amuakwa-Mensah & Boakye-Adjei, 2015; Amuakwa-Mensah, Marbuah & Marbuah, 2017). Lekwauwa and Bans' study from 2023 primarily focused on the profitability and portfolio management of Ghanaian commercial banks. The impact of loan portfolio management on the performance of Ghanaian banks was the focus of a recent study by Assifuah-Nunoo (2023). It is clear that loans are not the sole assets in banks' portfolios. The fact that banks are responsible for a number of portfolios focused solely on loans presents issues that require consideration. Furthermore, as was evident from the aforementioned literature review, the researchers did not consistently address the hypothesis of the impact of portfolio diversification on the financial performance of listed banks on the Ghana Stock Exchange, which is the ultimate objective of this current study. Therefore, the study aims to investigate how portfolio diversity affects the financial performance of particular listed banks on the Ghana Stock Exchange. The following research hypotheses were developed in accordance with the study's objective:

The study tested three null hypotheses to assess the relationship between various financial portfolios and the financial performance of selected listed banks on the Ghana Stock Exchange. The first hypothesis (H_{01}) posited that the deposit portfolio has no significant effect on the financial performance of these banks. The second hypothesis (H_{02}) stated that the loan portfolio has no significant effect on their financial performance. Lastly, the third hypothesis (H_{03}) asserted that investment portfolios have no significant effect on the financial performance of the selected listed banks on the Ghana Stock Exchange.

LITERATURE REVIEW

Theoretical Framework

The Modern Portfolio Theory (MPT), developed by Markowitz in 1952, provides a solid theoretical framework for evaluating portfolio diversification strategies. The theory is especially pertinent for investment firms looking to improve financial performance while reducing exposure to market fluctuations, as it places an emphasis on diversification as a means of optimizing risk-return trade-offs. Because Kenyan investment firms operate in erratic financial markets where risk management is essential to maintaining profitability and investor confidence, MPT is relevant to this study. The financial success of Sanlam Investments East Africa Limited (Sanlam, 2022) and the demise of Discount Securities Limited serve as examples of how portfolio composition can affect growth and stability.

To determine whether diversification enhances financial performance and reduces exposure to unsystematic risk, this study employs the MPT to analyze how listed banks on the Ghana Stock Exchange diversify their portfolios across asset classes and industries. MPT remains essential in investment decision-making, even in the face of critiques about rationality assumptions and market irregularities (Mandelbrot, 1963; Fama & French, 1992). For businesses seeking the best diversification strategies, ideas of the efficient frontier, risk quantification, and asset correlation offer an organized method. As a result, this study examines how portfolio diversification affects listed banks' financial performance on the Ghana Stock Exchange using MPT as a guiding framework.

Empirical review

The performance of manufacturing and investment enterprises was examined by Jabbarzadeh, Motavassel, and Mamsalehi (2014) using publicly traded shares on the Tehran Stock Exchange. Secondary data from 14 investment firms and 14 industrial firms were collected for this study, rather than primary data. The data was collected yearly between 2005 and 2009. Both manufacturing and investment firms outpaced stock market returns, with investment firms doing so more effectively. When it comes to commercial banks with a CBK license, Ngware, Olweny, and Muturi (2020) examined how bank size influences the relationship between financial performance and portfolio diversity. 43 commercial banks provided the data for the study, which used a causal research methodology. Data gathered between 2003 and 2017 were examined in the study using an unbalanced panel data model. The findings showed that portfolio diversity and a company's financial stability are causally related. The size of the bank had an impact on the relationship between portfolio diversity and financial performance, the study also showed.

In a similar vein, Bikeri (2022) examined the impact of portfolio diversification on the financial performance of Kenyan investment firms. The study employed Spearman's correlation analysis to examine secondary data from 29 financial publications, aiming to assess the relationship between firm size and diversification. The findings revealed a strong positive relationship between financial performance and the diversification index, suggesting that a larger portfolio enhances firm outcomes. Nevertheless, a negative relationship with firm size was observed, suggesting that diseconomies of scale cause returns to decrease as the scale increases. Further evidence that capital structure, liquidity, and financial performance had little bearing on firm outcomes in the context of diversification came from weak correlations between these variables. Nevertheless, this study did not specifically address NSE-listed companies and did not consider asset class diversification.

The Herfindahl-Hirschman Index (HHI), firm size as determined by total assets, and liquidity as determined by the current ratio were among the indicators used by Osewe (2020) to investigate portfolio diversification among investment firms listed on the Nairobi Securities Exchange (NSE). Targeting each of the five investment firms listed on the NSE, a descriptive research design was chosen. Multiple regression analysis results showed that diversification had a significant impact on financial performance as determined by ROA. These findings underscore the importance of diversification tactics in enhancing the performance of investment firms in Kenya. Although insightful, the study did not examine the risk management component of diversification, which is something this study attempts to address.

Ehiedu and Priscilla (2022) evaluated the impact of corporate diversification strategies on financial performance in Nigeria's industrial goods sector. Using least square regression, historical data from 2012 to 2021 showed divergent effects of diversification. While diversifying business segments had a positive impact on performance, income diversification had no discernible effect on ROA. This discrepancy emphasises how crucial it is to modify diversification tactics according to industry-specific circumstances in order to achieve the best results.

Ndungu and Muturi (2019) investigated how the financial performance of Kenyan commercial banks was affected by product, geographic, and income diversification. Data from 2013 to 2017 showed that while product diversification had a negative impact on performance, income source and geographic diversification had a positive effect. To optimise performance benefits, these findings highlight the necessity for bank managers to carefully match diversification strategies with their organisational structure, policies, and objectives. The banking industry, not the NSE, was the study's primary focus.

Another important factor influencing financial performance is the size of the portfolio. Kimani and Aduda (2016) examined the impact of portfolio size on the performance of Kenyan investment firms. The study, which employed a descriptive survey design and examined secondary data from 45 companies, found that stocks comprised the most significant and lucrative portion of the portfolio, with bonds and money market investments ranking second and third, respectively. Despite their prominence, real estate portfolios produced the lowest returns. These findings demonstrate the crucial role of strategic asset allocation in investment firms' financial success. Diversification of loan portfolios has also drawn interest from academics.

The effect of loan portfolio diversification on the performance of Sri Lankan commercial banks was examined by Kumanayake et al. (2019). The study found a negative correlation between loan diversification and financial performance, using the CAMEL model to evaluate performance and the Hirschman-Herfindahl Index to measure diversification. According to this research, bank profitability may be increased by concentrating on a smaller number of high-performing loan segments. In a similar vein, Adzobu et al. (2017) discovered that, as indicated by ROA and ROE, loan diversification across sectors did not increase profitability or reduce credit risks in Ghanaian banks. These findings underscore the challenges of managing loan portfolios and emphasize the need for banks to develop targeted strategies tailored to specific market conditions.

Sindhu, Ul-Haq, and Ali (2014) explored the connection between performance and diversity in Pakistani businesses. The study utilized data from 16 Pakistani companies that had issued common shares between 2004 and 2009. Due to their higher debt-to-equity ratios compared to undiversified companies, the study's panel data analysis approach indicated that diversified organizations were perceived as riskier. Because the undiversified businesses had fewer liquidation risks, they produced superior financial performance.

In their 2015 analysis, Kisaka and Kitur attempted to determine if larger NSE portfolios were more likely to experience higher overall risk. Between 2009 and 2013, 43 businesses provided researchers with monthly secondary data. According to the research that supported the use of pooled OLS regression, the magnitude of unsystematic risk decreased as portfolio size grew. Unsystematic risk, however, began to rise as soon as the portfolio size surpassed the optimal range. Only two areas were examined in the study: the identification of the best portfolio and the relationship between portfolio size and risk. It is necessary to conduct a more comprehensive study on the impact of portfolio diversity on economic outcomes.

Kiio and Ambrose (2017) examined companies that have floated common stock on the NSE, examining the relationship between the company's performance and the application of risk management techniques. The five-year panel data analysis covered all of the aforementioned companies. A multivariate regression model was employed to evaluate the effect of using derivatives to hedge various market risks. The findings demonstrated that employing risk hedging strategies helped the bottom lines of the organisations. The study examined the relationship between risk hedging and the financial success of businesses across various sectors of the National Stock Exchange (NSE), using data from the NSE. There is a knowledge gap between them, as investment firms differ from other companies in that they invest in the equities of other publicly traded companies.

The authors Kim, Batten, and Ryu (2020) examined the effect of bank diversification on the stability and safety of commercial banks in the United States and Europe. In the study, a significant non-linear correlation was discovered. Additionally, the study demonstrated that while boosting bank diversification to an extreme level was unproductive in terms of returns, doing so at a moderate level improved bank stability. The study went on to demonstrate that bank diversification benefited stability prior to the financial crisis but harmed it during it. The study's findings lead to the recommendation that banks should scale back on their unconventional operations during periods of general financial crises.

Mulwa and Kosgei (2016) looked at the financial performance of Kenya's commercial banks in terms of solvency, diversification, and credit risk. The study collected and analysed data from 43 commercial banks with the necessary licences using an ex post facto research methodology. A panel of respondents offered their responses from 2011 to 2015. Using a fixed-effects panel data model, it was found that geographical diversification had a favorable impact on financial outcomes. However, the relationship between asset and income diversification and economic success was inverse. There is a dearth of information on how diversity affects the bottom line for investment organisations because the study concentrated on commercial banks.

Eukeria and Favourate (2014) examined companies that have issued shares on the Zimbabwe Stock Exchange and looked at the relationship between diversity and financial success. Granger causality and pooled ordinary least squares regression were used to establish the causal direction. The study discovered that diversified businesses outperformed their non-diversified competitors. Due to the study's focus on the Food and beverage Sector, whose operations are separate from those of investment businesses, there is a paucity of knowledge regarding the effect of diversification on the performance of investment firms. Kimeu, Anyango, and Rotich (2016) examined investment firms that have launched common stock at the NSE to ascertain the relationship between financial performance and portfolio composition. The study's quantitative research methodology facilitated the collection and analysis of secondary data collected between 2012 and 2014. OLS regression was employed, as in Kamwaro (2008), to examine the relationship between the variables of interest and their results. The evidence was clear that portfolio diversification improved financial results. For the analysis, data were gathered between 2012 and 2014. Investment firms have already rebalanced their portfolios, necessitating a fresh analysis that incorporates the most recent information.

Abor and Biekpe (2006) emphasise the value of portfolio diversification in emerging markets in their study. They examine the ways in which spreading investments across different asset classes can reduce risk and possibly increase returns. The authors emphasise the importance of asset allocation in attaining financial stability by using quantitative techniques to compare the performance of diversified and non-diversified portfolios. According to the results, diversification can be very advantageous for investors, especially in erratic markets. The risk associated with individual assets is reduced by distributing investments across several industries or geographical areas, resulting in a more stable overall portfolio performance. The study highlights that

diversification can significantly reduce the impact of market fluctuations on an investor's overall returns, even though it does not entirely eliminate risk.

Konovalova et al. (2019) focus on managing a diversified portfolio of mutual funds and emphasise VaR (Value at Risk) in this context. The researchers calculated the portfolio's VaR for each asset and the portfolio's weights based on the VaR and the likelihood of loss for each asset using a universal indicator and mathematical and statistical analysis. Based on the yield, risk, and average and median daily returns of the MICEX index from 2010 to 2017, stocks were chosen for the portfolio. After optimisation, it was discovered that the portfolio had an annual yield of 29.6% and a relatively high risk of 23.4%. Although portfolio risk is the study's primary focus, it also includes highlights on portfolio optimisation.

Obiero (2019) investigated the financial performance of investment companies listed on the Nairobi Stock Exchange (NSE) and portfolio diversification in Kenya. The study found that investments in bonds, stocks, and real estate all had a substantial impact on the financial performance of investment businesses listed on the NSE. Portfolio optimization, while considering optimization costs, is the primary focus of Chavalle (2019). For each of four portfolios with fifteen holdings, he runs 12 simulations with incremental investments to find the optimal stock weights. The fact that the same stocks are present in all four portfolios may reduce their overall diversification.

Sentiment research should be utilized, according to Banholzer (2019), for effective portfolio management. He measured optimism in four worldwide markets for his study using the PCA approach. The goal of the study is to measure how investor attitude affects portfolio returns and volatility. To accomplish this, certain weights have been allocated to assets with low and high sentiment values, respectively.

The Pontryagin Maximum Principle and Markowitz's theory of portfolio valuation serve as the foundation for the portfolio management solutions recommended by Oliinyk (2019). In his analysis, the key risk indicators for the portfolio are VaR (Value at Risk) and CVaR (Conditional Value at Risk), with NPV (Net Present Value) used to assess the portfolio's performance. Through diversification, Alexeev et al. (2015) use a range of portfolio sizes and configurations to lower overall risk. According to the study, high-frequency data (at 5-minute intervals) should be used to calculate the conditional correlation between the stocks in the portfolio. The research used various stock-holding portfolio sizes (five, ten, twenty, thirty, and forty stocks).

Dixit (2020) also suggests using CVaR as a yardstick for portfolio success. Three different portfolios were suggested based on the risk and return parameters she established. These portfolios may fall into one of three categories: (a) totally risk-free (suited for investors with a high-risk tolerance); (b) completely risk-averse (ideal for investors with a low risk tolerance); or (c) a blended compromise (appropriate for investors with a moderate risk tolerance). The goal of this study is to discover the best methods for diversifying a portfolio to minimise risk.

Mensi et al. (2017) conducted research on the importance of portfolio variety by contrasting the stock markets of industrialised and developing nations. The authors of the study recommend that stocks with high dividend yields in emerging markets, such as Brazil, Russia, India, China, and South Africa (the BRICS countries), be balanced with stocks from more established markets, including the United States, Japan, and certain European nations, which offer lower yields but lower risk. The study continued by stating that increasing stock weights from developed nations is the best method for taming VaR rather than investing in risk-free assets on developed-market stock exchanges (Chulia et al., 2017).

Research Gap

The literature review identifies specific knowledge gaps regarding how portfolio diversification affects the financial performance of listed banks on the Ghana Stock Exchange. Although the results obtained by Owusu-Ansah (2019) revealed that return on equity (ROE) and return on assets (ROA) are typically better for banks with diversified portfolios. In another development, it has been found that diversification not only spreads risk but also enables banks to access multiple revenue streams, thereby increasing overall profitability, according to a study by Mensah and Osei (2021). For bank management strategies that optimise asset allocation and enhance

financial health, these findings are essential. In contrast to their less diversified counterparts, diversified banks fared better during economic downturns, according to a study by Owusu-Ansah et al. (2020). In a similar vein, a study by Abor and Biekpe (2006) found that banks with diversified operations had higher returns on equity (ROE). These results suggest that for banks listed on the Ghana Stock Exchange, successful diversification strategies can lead to enhanced financial resilience and improved overall performance.

According to the studies cited, diversification is positively correlated with enhanced financial performance metrics for Ghanaian banks, including return on equity (ROE) and return on assets (ROA). However, there is evidence that diversified banks perform better, as used in Owusu-Ansah (2019) and Mensah and Osei (2021). There is still a dearth of thorough research on how these diversification tactics are adapted to Ghana's particular economic environment. Additionally, the studies primarily focus on the results rather than the specific tactics employed by banks to achieve successful diversification.

Portfolio diversification is a crucial financial strategy for reducing risk and enhancing returns. However, there has been little empirical research on the precise effects of this strategy on the financial performance of banks listed on the Ghana Stock Exchange. Most recent studies usually extrapolate findings from other industries or markets, which may not adequately represent Ghana's unique economic and regulatory environment. By exploiting this gap, researchers can examine the effects of varying degrees of diversification within bank portfolios on their overall stability, profitability, and financial performance. Understanding both the "what" and the "how" of diversification in Ghanaian banks is a significant research gap. How, for example, do these banks find sources of income that meet the needs of the regional market? What obstacles do they encounter when putting these strategies into practice, particularly when the economy is struggling? Examining these issues could provide insightful information for bank management plans aimed at maximizing asset allocation and improving Ghana's financial stability.

METHODOLOGY

The procedures followed during the study are described in this section. These comprise research philosophy, design, population, sampling, data collection procedures, model specification, and data analysis and discussion.

According to McMurray (2005), a philosophy can be thought of as the fundamental belief system or worldview that establishes the nature of the universe and the place of individuals within it. Philosophy is a fundamental perspective that scientists often adopt in their search for meaning. The paradigm positivist school of thought was used to frame the investigation. This school of thought emphasizes objectivity, which requires that researchers be impartial, independent of their own values, and unbiased in the research they conduct (Creswell, 2004). To investigate the impact of portfolio diversity on the financial performance of a select group of listed banks on the Ghana Stock Exchange, the study employed a quantitative paradigm. This idea served as the foundation of the study because observation and measurement are at the heart of science. The study employed a logical approach, as it was based on examining widely held beliefs (Saunders & Thornhill, 2009).

A research design is a plan that lays out the specifics of how a study was done (Sekaran & Bougie, 2013; Kothari, 2011; Cooper & Schindler, 2014). Further, a research design is defined by Saunders, Lewis, and Thornhill (2014) as a strategy that explains how the study will be structured and ensures that the aims are achieved. The study employed a descriptive research design. The method was considered suitable because it provides a complete and transparent account of the analysed findings, as obtained in a natural and uninfluenced environment, and, without manipulation of the collected data, explains the relevant aspects of the phenomena under the circumstances the study investigated.

Descriptive correlational research was employed in this study, which involves collecting data on study units at a specific time point and examining it for associations (Saunders et al., 2014; Mulwa, 2013). The quantitative data were also analyzed to assess the current state of the selected banks, including their deposit, loan, and investment portfolios, as well as their impact on return on assets and return on equity.

The study primarily focuses on all the listed banks on the Ghana Stock Exchange. However, four of the listed banks were selected and investigated. These are Access Bank Ghana Limited, the Agricultural Development

Bank, Cal Bank Ghana Limited, and GCB. The banks are located throughout Ghana, with their head offices based in Accra.

In the view of Nyamura (2014), a target population is the precise population from which the data is preferred to be collected. The population is defined by Waithira (2013) as the entire classification of elements to which the researcher can admissibly apply the results found in the findings. At the time of this study, there were 11 listed banks on the Ghana Stock Exchange (Ghana Stock Exchange, 2023), which formed the study population.

It is essential for a researcher to identify the characteristics of the population and ensure that these are accurately replicated in the chosen sample when sampling. The sample size from all listed banks on the Ghana Stock Exchange was determined through the purposive sampling technique.

A sample should accurately reflect as many characteristics of the target population as possible. When the sample population is large, well-founded results are produced because there is less error; however, when the sample population is small, there is more error, which means the results do not accurately reflect the full population. The study used a sample size of four (4).

The study utilized secondary data collected from the published financial statements of the respective banks over the eleven years from 2012 to 2022. The researchers extracted information on deposits, loans, investments, and return on assets and return on equity for the aforementioned years.

The statistical tool, such as STATA 14, is used to check, code, and run the raw data to provide descriptive statistics, inferential statistics, and regression coefficients, which determine the effect of portfolio diversification on the financial performance of selected banks listed on the Ghana Stock Exchange. It used fixed effects and random effects, as well as the Hausman test. In addition, the F-test was used to test the fitness of the regression analysis model before the model's coefficients were analysed and understood.

RESULTS

Descriptive statistics

The section presents data analysis and discussion of findings using various approaches and methods described in methodology.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Dep	44	.6811902	.0888546	.4609087	.8119517
Loan	44	.4085309	.1394385	.1557632	.7347051
Inv	44	.2189146	.1419183	0	.5299677
ROA	44	.0286247	.0196161	-.037	.05902
ROE	44	.1885949	.1305915	-.2372	.3949795

The dataset contains information on the variables related to banks' portfolio diversification and their performance. The variables included are Deposits (Dep), Loans (Loan), Investments (Inv), Return on Assets (ROA), and Return on Equity (ROE). Examining the descriptive statistics of the dataset, we find that the average value of Deposits is approximately 0.681, with a relatively low standard deviation of 0.089. The range of values for Deposits spans from 0.461 to 0.812. Loans have an average value of around 0.409, with a slightly higher standard deviation of 0.139. The minimum value for Loans is 0.156, while the maximum is 0.735. Investments have an average value of approximately 0.219, with a standard deviation of 0.142. The range of values for Investments starts from 0 and goes up to 0.530. The Return on Assets variable shows an average value of 0.029, indicating a moderate level of profitability for the banks. The standard deviation of 0.020 suggests some variability in the performance of banks in terms of their return on assets. The range of values for Return on Assets extends from -0.037 to 0.059.

The Return on Equity variable has an average value of 0.189, indicating a relatively favourable return on equity for the banks in the dataset. The standard deviation of 0.131 implies some degree of variability in the return on equity across banks. The minimum value for Return on Equity is -0.237, while the maximum is 0.395. These descriptive statistics provide a basic understanding of the dataset and the variables under consideration. Further analysis and modelling can now be conducted to explore the relationships between banks' portfolio diversification (Deposits, Loans, and Investments) and their performance indicators (Return on Assets and Return on Equity).

Effect of Portfolio Diversification on the Profitability of Banks

The analysis focuses on examining the impact of banks' portfolio diversification on their performance, specifically in relation to the dependent variable, Return on Assets (ROA), using independent variables such as Deposits (Dep), Loans (Loan), and Investments (Inv). The analysis employs fixed-effects (within) regression, random-effects GLS regression, and the Hausman test to provide insights into the results.

Table 3. Effect of portfolio diversification on the Profitability of Banks

Fixed-effects (within) regression		Number of obs	=	44
Group variable: Bank		Number of groups	=	4
R-sq:		Obs per group:		
within	= 0.2908	min	=	11
between	= 0.0007	avg	=	11.0
overall	= 0.0677	max	=	11
corr(u_i, Xb) = -0.5473		F(3, 37)	=	5.06
		Prob > F	=	0.0049

ROA	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Dep	-.1256569	.0423275	-2.97	0.005	-.2114207	-.0398932
Loan	.0505406	.0211768	2.39	0.022	.0076323	.0934489
Inv	.005764	.0238868	0.24	0.811	-.0426352	.0541632
_cons	.0923118	.0309514	2.98	0.005	.0295984	.1550252
sigma_u	.01823141					
sigma_e	.0144668					
rho	.61362572	(fraction of variance due to u_i)				

In the fixed-effects regression, which considers bank-specific fixed effects, the coefficients demonstrate the following effects on ROA: Deposits (Dep): With a coefficient of -0.126, a unit increase in deposits is associated with a decrease in ROA by approximately 0.126 (p-value = 0.005). This suggests that higher deposit levels may have a negative impact on ROA. The findings were inconsistent with those of Islam et al. (2017), who found a significant positive effect of deposits on the financial performance of banks in Bangladesh. Loans (Loan): The coefficient of 0.051 indicates that for each unit increase in loans, ROA increases by approximately 0.051 (p-value = 0.022). This implies that higher loan levels have a positive influence on ROA. Furthermore, the findings were consistent with the results of Ongore and Kusa (2021), who found a significant positive effect of loans on the financial performance of commercial banks in Kenya.

Investments (Inv): The coefficient for investments is not statistically significant (p-value = 0.811), suggesting that changes in investments do not have a significant effect on ROA. The outcomes contradict the results of Makau and Ambrose (2018), who found a positive and significant effect of investment on the financial performance of investment firms listed on the Nairobi Securities Exchange, as well as those of Lamichhane (2021), who obtained similar results from listed companies in Nepal.

Constant (_cons): The intercept term represents the baseline ROA when all independent variables are zero and is statistically significant (p-value = 0.005). Moving on to the random-effects GLS regression, which accounts for bank-specific random effects, the coefficients reveal the following effects on ROA:

Table 4. Coefficients for Return on Assets

Random-effects GLS regression		Number of obs	=	44
Group variable: Bank		Number of groups	=	4
R-sq:		Obs per group:		
within	= 0.1296	min	=	11
between	= 0.3817	avg	=	11.0
overall	= 0.1895	max	=	11
corr(u_i, X) = 0 (assumed)		Wald chi2(3)	=	9.35
		Prob > chi2	=	0.0249

ROA	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Dep	-.0748087	.034843	-2.15	0.032	-.1430998	-.0065175
Loan	.0008987	.0233765	0.04	0.969	-.0449185	.0467159
Inv	-.0557543	.024228	-2.30	0.021	-.1032403	-.0082682
_cons	.0914219	.0313195	2.92	0.004	.0300368	.1528071

Deposits (Dep): The coefficient of -0.075 suggests that a one-unit increase in deposits is associated with a decrease in ROA of approximately 0.075 (p-value = 0.032), indicating a potential negative relationship between deposits and ROA. The findings supported the results of Lipunga (2014) while contradicting the findings obtained by Assifuah-Nunoo (2023), who found a positive and significant effect on loan portfolio management on the performance of banks in Ghana. Loans (Loan): The coefficient for loans is not statistically significant (p-value = 0.969), implying that changes in loan levels do not have a significant impact on ROA. In addition, the results failed to align with the findings established by Lamichhane (2021) for the listed companies in Nepal.

Investments (Inv): With a coefficient of -0.056, each unit increase in investments is associated with a decrease in ROA by approximately 0.056 (p-value = 0.021), suggesting a potential negative influence of investments on ROA. Furthermore, the outcomes contradict the results of Hubarieva, Lebid, and Zuieva (2017), who found a positive and significant effect of investment on the financial performance of Ukrainian banks. Likewise, the findings also were not consistent with Makau and Ambrose's (2018) results on investment firms listed on the Nairobi Securities Exchange. Constant (_cons): The intercept term is statistically significant (p-value = 0.004), representing the baseline ROA when all independent variables are zero. To determine the most appropriate model for assessing the effect of portfolio diversification on banks' performance, the Hausman test is conducted. The test compares the coefficients from the fixed-effects and random-effects models and examines whether the fixed-effects model is more suitable.

Table 5. Hausman Fixed Random

. hausman fixed random				
	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Dep	-.1256569	-.0748087	-.0508483	.024033
Loan	.0505406	.0008987	.0496419	.
Inv	.005764	-.0557543	.0615183	.

b = consistent under Ho and Ha; obtained from xtreg	
B = inconsistent under Ha, efficient under Ho; obtained from xtreg	
Test: Ho: difference in coefficients not systematic	
chi2(3)	= (b-B)' [(V_b-V_B)^(-1)] (b-B)
	= 0.23
Prob>chi2	= 0.9731

The Hausman test results in a chi-square statistic of 0.23 and a p-value of 0.9731. Since the p-value is greater than the significance level of 0.05, we fail to reject the null hypothesis. Therefore, based on the Hausman test, we conclude that the random-effects model is more appropriate for examining the effect of portfolio diversification on banks' performance. The analysis suggests that higher deposit levels may have a negative impact on ROA, while increased loan levels have a positive influence. Investments do not appear to have a significant impact on ROA.

ROE as Dependent Variable

The analysis examines the effect of banks' portfolio diversification on their performance, with the dependent variable being Return on Equity (ROE). The independent variables include Deposits (Dep), Loans (Loan), and Investments (Inv). Two models are employed: fixed-effects (within) regression and random-effects GLS regression. Additionally, the Hausman test is conducted to determine the most appropriate model.

Table 6. ROE as Dependent Variable

Fixed-effects (within) regression	Number of obs	=	44
Group variable: Bank	Number of groups	=	4
R-sq:	Obs per group:		
within = 0.2260	min =		11
between = 0.0042	avg =		11.0
overall = 0.0402	max =		11
	F(3,37)	=	3.60
corr(u_i, Xb) = -0.4317	Prob > F	=	0.0223

ROE	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Dep	-.6113598	.2720686	-2.25	0.031	-1.162623	-.0600964
Loan	.2952452	.1361183	2.17	0.037	.0194434	.571047
Inv	.0187277	.153537	0.12	0.904	-.2923678	.3298233
_cons	.4803307	.198946	2.41	0.021	.0772279	.8834335

In the fixed-effects (within) regression model, which accounts for bank-specific fixed effects, the coefficients reveal the following effects on ROE: Deposits (Dep): The coefficient of -0.611 suggests that an increase in deposits is associated with a decrease in ROE by approximately 0.611 (p-value = 0.031). Thus, higher deposit levels potentially have a negative impact on ROE. According to the study's results, the outcomes obtained by Gul, Irshad, and Zaman (2011) on the impact of deposits on profitability indicators, such as Return on Assets (ROA) and Return on Equity (ROE), were not supported by the current study's findings. Loans (Loan): With a coefficient of 0.295, each unit increase in loans is associated with an increase in ROE by approximately 0.295 (p-value = 0.037). This suggests that higher loan levels have a positive influence on ROE. The results from the study supported the outcome of Molson, Njeru, and Memba (2018). The results of the current study contradict those of Serem, Gregory, and Okwaro (2017), who found a negative impact of the loan portfolio on the financial performance of banks.

Investments (Inv): The coefficient for investments is not statistically significant (p-value = 0.904), indicating that changes in investment levels have no significant effect on ROE. The findings of Hanin, Noriza, and Mohamad (2017) revealed a significant positive correlation between investment in bonds and financial performance. This study did not support this result. Constant (_cons): The intercept term represents the baseline ROE when all independent variables are zero and is statistically significant (p-value = 0.021). Moving to the random-effects GLS regression, which accounts for bank-specific random effects, the coefficients indicate the following effects on ROE:

The analysis examines the effect of banks' portfolio diversification on Return on Equity (ROE). Two models were estimated: a fixed-effects regression and a random-effects GLS regression. The fixed-effects model accounts for individual bank-specific effects, while the random-effects model allows for unobserved heterogeneity across banks.

Table 7. Return on Equity

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Random-effects GLS regression              Number of obs   =           44
Group variable: Bank                      Number of groups =           4

R-sq:                                     Obs per group:
    within = 0.0841                        min =           11
    between = 0.7839                       avg =          11.0
    overall = 0.2196                       max =           11

corr(u_i, X) = 0 (assumed)                Wald chi2(3)    =          11.25
                                           Prob > chi2     =          0.0104
```

ROE	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Dep	-.3774944	.2276205	-1.66	0.097	-.8236224	.0686337
Loan	.0050524	.1527129	0.03	0.974	-.2942594	.3043641
Inv	-.4445551	.1582753	-2.81	0.005	-.754769	-.1343412
_cons	.540996	.2046023	2.64	0.008	.1399828	.9420091

Deposits (Dep): The coefficient of -0.377 suggests that an increase in deposits is associated with a decrease in ROE by approximately 0.377 (p-value = 0.097), indicating a potential negative relationship between deposits and ROE. Loans (Loan): The coefficient for loans is not statistically significant (p-value = 0.974), implying that changes in loan levels do not have a significant impact on ROE. Investments (Inv): With a coefficient of -0.445, each unit increase in investments is associated with a decrease in ROE by approximately 0.445 (p-value = 0.005), suggesting a potential negative influence of investments on ROE. Constant (_cons): The intercept term is statistically significant (p-value = 0.008), representing the baseline ROE when all independent variables are zero. To determine the most appropriate model, the Hausman test is performed. The test compares the coefficients from the fixed-effects and random-effects models and examines whether the fixed-effects model is more suitable.

Table 8. Coefficients for Return on Equity

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. hausman fixed random
```

	—— Coefficients ——			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Dep	-.6113598	-.3774944	-.2338655	.149031
Loan	.2952452	.0050524	.2901928	.
Inv	.0187277	-.4445551	.4632828	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = -6.78      chi2<0 ==> model fitted on these
```

The negative Hausman test result suggests that the random effects model is more appropriate than the fixed effects model when using Return on Equity (ROE) as the dependent variable. The Hausman test assesses the consistency of the coefficients between the fixed effects and random effects models. A negative Hausman test statistic indicates that the random effects model is more efficient and consistent with the data. The analysis suggests that higher deposit levels may have a negative impact on ROE, while increased loan levels may have a positive influence. Investments significantly affect ROE negatively.

CONCLUSION

Based on the research findings presented in the preceding chapter, the study draws the following conclusions regarding the objectives and hypotheses. According to the study, the aggregate influence of deposit, loan, and investment portfolios on the financial performance of listed banks on the Ghana Stock Exchange is statistically insignificant. The analysis suggests that higher deposit levels may have a negative impact on ROA, while increased loan levels have a positive influence. Investments do not appear to have a significant impact on ROA. The conclusion is also drawn that the analysis suggests that higher deposit levels may have a negative impact on ROE, while increased loan levels may have a positive influence. Investments significantly affect ROE negatively. The analysis determined that out of the three portfolio variables examined, deposits and investments have adverse effects on financial performance, while only loans resulted in positive and statistically significant effects. To prevent deposits and investments from having a negative impact on the financial performance of the selected banks, management should pay attention to their deposit and investment portfolios. It is recommended that diversifying the loan portfolio would be a prudent decision, which can achieve a positive and significant impact on their financial performance. The study further suggests that bank management should focus on developing analytical abilities and skills to analyze portfolios before final decisions are made, aiming for continuous improvement in financial performance.

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