

LOAN PORTFOLIO DIVERSIFICATION AND BANK RETURNS: DO BUSINESS MODELS AND MARKET POWER MATTER?

¹Reindolph Osei-Anim, ²Newman Amaning, ³Joyce Ama Quartey, ⁴Enoch Sarpong

¹Department of Accounting and Finance, Christian Service University, Kumasi.

ORCID <https://orcid.org/0009-0000-8006-057X> E-mail oseianim@rocketmail.com

²Department of Accounting and Business Analytics, Sunyani Technical University, P.O Box 206

Sunyani, Ghana ORCID: <https://orcid.org/0000-0002-5752-0651>

E-mail newman.amaning@stu.edu.gh

³Department of Accounting and Finance, Christian Service University, Kumasi, Ghana.

<https://orcid.org/0000-0003-2195-7912> E-mail jquartey@csuc.edu.gh

⁴Department of Accounting and Finance, KNUST, Kumasi. E-mail enoch.sarpong@yahoo.com

Received: 2026-03-27

Accepted: 2026-05-16

Published online: 2026-06-29

Abstract

This study examines the effect of business models and market power on loan portfolio diversification and bank returns among listed commercial banks in Ghana. The study covers all eight (8) commercial banks listed on the Ghana Stock Exchange, with a purposive sample of five (5) banks selected due to data availability and consistency over the period 2013 to 2022. Using panel data regression with fixed effects estimation, the study analyzes the relationships among loan portfolio diversification, business models, market power, and bank performance. The empirical results show that loan portfolio diversification has a statistically significant positive effect on bank returns, indicating that banks with more diversified loan portfolios tend to achieve improved financial performance.

The findings also reveal that business models significantly influence bank returns, suggesting that the combination of interest and non-interest income activities enhances profitability. However, market power is found to have an insignificant direct effect on bank returns. Further analysis indicates that the impact of loan portfolio diversification on bank performance varies depending on market structure, implying that the effects are more pronounced in markets with differing levels of concentration. The study therefore concludes that diversification enhances bank returns, particularly when supported by appropriate business model strategies, although market power alone does not significantly drive performance.

The study recommends that bank managers and regulatory authorities strengthen bank-wide risk management frameworks and develop more detailed regulatory guidelines to support effective loan portfolio diversification and sustainable banking performance.

Keywords: Portfolio, Diversification, Market Power, Bank Returns.

1. Introduction

Ghana's economy largely depends on the agriculture sector, industrial sector, and service sector. The banking industry or sector is an integral part of the service sector, which is three-fifths of the Gross Domestic Product of Ghana (World Bank,

2021). The banking sector is critical to economic growth and transformation, which directly affects the lives of the people. According to Rahayu, et al. (2020), the banking sector mobilized financially from a surplus to a deficit of any economy. In 2015, the Ghanaian banking sector was hit by a credibility crisis cracking the financial sector of the country (Acquah, 2020). A wave of high-profile corporate scandals and failures in the Ghanaian financial sector shook the banking industry, manifesting as a result of unethical behaviour and perverted impulses that were at odds with the relevant regulatory frameworks. The Bank of Ghana (BoG) noted that insider trading abuses, poor corporate governance, low quality assets, bad management, and a low capital base plagued the banking system in 2017 (Ministry of Finance-Ghana, 2018). The Bank of Ghana (BoG) instructed the banks to increase their capital base from GH¢120 million to GH¢400 million in order to ensure that banks maintain high quality assets and operate within prudential criteria. (Acquah, 2020). According to Japan and Van (2020), these reforms have significantly increased the competitive environment in the banking system. This has allowed banks to provide loans to different sectors and even to unfamiliar ones for which they did not grant loans to them (Dang, 2019). A report by PricewaterhouseCoopers (2020) indicated that the bank's gross loans grew by 24% from GHS747.4 million at the end of 2018 to GHS927.3 million at the end of 2019. The growth in the bank's gross loans was an accumulation of interest from existing loan facilities. A Bank of Ghana report in 2020 revealed that gross non-performing loans have steadily increased from 4.4% in 2017 to 9.6% in 2018 (Bank of Ghana, 2020). The gross non-performing loans of the banks further deteriorated from 9.6% in 2018 to 14.8% at the end-2020 (end-2019: 14.3%) (Bank of Ghana, 2020). The business model simulates how bank activities, funding and matching of assets to liability should be done. It provides a rationale on how to observe traditional lending and deposit-taking services of the banks. There are various business models available to the bank in diversifying loan portfolios. For instance, to maximize return and diversify credit risks, banks can integrate the operations of interest-earning and non-interest-earning assets. Also, banks can combine income-generating activities and income from risky activities depending on the co-movements from these activities. This combination reduces bank fragility which is heavily dependent on customers' deposits which are likely to be withdrawn prematurely (Song and Thakor, 2017). This is because customer deposits are held for the liquidity services of the banks. This model helps predict high bank returns on generated interest income and deposit funding. However, the absence of such a business model increases the bank's fragility and reduces overall performance. Consequently, the purpose of this study is to determine whether loan portfolio diversity and bank returns are related. And, since the recent banking sector reforms ensure the diversity of loan portfolios to avoid over-concentrating on lending to one or a few sectors.

Although extensive empirical literature exists on bank diversification, market power, and financial performance, important gaps remain, particularly within emerging

banking markets such as Ghana. First, prior studies have largely examined loan portfolio diversification and bank stability independently, with limited attention to how business models and market power jointly influence bank returns and stability. Existing studies often focus on either diversification effects or market concentration effects in isolation, thereby overlooking the interactive dynamics between these variables.

Second, much of the empirical evidence on diversification and market power is concentrated in developed economies, where banking structures, regulatory systems, and competitive environments differ substantially from those in Sub-Saharan Africa. Consequently, findings from advanced economies may not be directly applicable to Ghana's banking sector, which has recently experienced significant regulatory reforms, banking sector clean-up exercises, and heightened competition.

Third, previous Ghanaian banking studies have predominantly focused on profitability, efficiency, or credit risk, with limited empirical investigation into how loan portfolio diversification contributes to bank stability under varying levels of market concentration. More importantly, the moderating role of market power in the relationship between loan portfolio diversification and bank stability remains underexplored in the Ghanaian context.

Additionally, earlier studies frequently employ broad banking samples without specifically examining listed commercial banks, despite the fact that listed banks operate under stricter disclosure requirements, governance standards, and investor scrutiny that may influence diversification strategies and financial outcomes differently.

Therefore, this study fills these gaps by investigating the effect of loan portfolio diversification on bank stability and returns while incorporating market power as a conditioning factor among listed commercial banks in Ghana from 2013 to 2022. By focusing on an emerging economy and integrating diversification, market structure, and business model perspectives into a single framework, the study provides fresh empirical evidence and policy insights relevant to banking regulation and risk management.

2. Literature Review

The reviewed literature provides substantial insight into the Ghanaian banking industry, bank performance, loan portfolio diversification, business models, and bank returns. However, the studies reveal conceptual inconsistencies, methodological limitations, and contextual gaps that justify further investigation, particularly within the Ghanaian banking sector.

Ghanaian Banking Industry and Bank Performance

The literature establishes that the Ghanaian banking industry has undergone significant reforms aimed at strengthening capitalization, liquidity, solvency, and public confidence in the financial system. The banking clean-up exercise and recapitalization reforms introduced by the Bank of Ghana improved the resilience and profitability of banks. Studies by the World Bank (2019) and the Ministry of Finance-Ghana (2020) indicate that the sector has become more stable and better capitalized despite challenges such as regulatory interference, underdeveloped financial markets, and macroeconomic instability. However, the discussion of bank performance in the literature remains largely descriptive and lacks deeper theoretical integration. Most studies measure bank performance using accounting indicators such as Return on Assets (ROA) and Return on Equity (ROE), with limited consideration of market-based or risk-adjusted performance measures. While these profitability indicators are widely accepted, relying solely on them may not fully capture banks' operational efficiency and risk exposure. Furthermore, the literature inadequately links the evolving structure of Ghana's banking industry to strategic lending decisions and portfolio diversification behavior.

Loan Portfolio Diversification and Risk Management

The literature strongly emphasizes loan portfolio diversification as a risk management strategy intended to reduce unsystematic risk and improve financial stability. Traditional banking theory supports diversification on the grounds that spreading loans across sectors minimizes idiosyncratic shocks and reduces default risk. Conversely, corporate finance theory argues that specialization may enhance screening efficiency and reduce information asymmetry, thereby improving loan quality and returns.

This theoretical contradiction creates an unresolved debate within banking literature. While diversification theoretically reduces exposure to sector-specific shocks, excessive diversification may weaken banks' monitoring capacity and increase operational complexity. The reviewed empirical studies reflect this inconsistency.

For example, studies by Dzidzor et al. (2015), Lydia et al. (2017), and Japan and Van-Dan (2020) conclude that loan portfolio diversification negatively affects bank profitability and may increase credit risk. Similarly, Meutia and Chalid (2021) found that diversification decreases bank stability in Indonesia. These findings support the argument that diversification may dilute managerial expertise and weaken borrower monitoring.

In contrast, Chen et al. (2014) and Stefania et al. (2009) reported that diversification reduces bank risk, although sometimes at the expense of lower returns. Meanwhile, Tabak et al. (2011) and Nadya et al. (2013) suggest that concentration rather than diversification improves bank returns and reduces risk due to enhanced industry specialization.

The divergence in findings suggests that the relationship between diversification and bank returns is context-specific and may depend on institutional quality, regulatory frameworks, market structure, and banks' business models. Thus, no clear consensus exists in the literature regarding whether diversification enhances or weakens bank performance.

Business Models and Bank Returns

The literature recognizes business models as important determinants of banks' profitability and risk behavior. Studies such as Huynh and Dang (2021) and Tuan (2020) suggest that combining interest and non-interest income activities improves financial stability and reduces dependence on traditional deposit funding. This supports the modern banking argument that diversified revenue streams strengthen resilience and profitability.

Nevertheless, the literature does not sufficiently explain how business models interact with loan portfolio diversification to influence bank returns. Existing studies often treat diversification and business models as separate constructs, thereby ignoring their potential complementarity. In addition, most empirical studies focus on developed or Asian banking systems, leaving limited evidence from African emerging economies such as Ghana.

Another limitation is that prior studies predominantly rely on accounting-based measures of returns without incorporating broader indicators such as market valuation, efficiency, or risk-adjusted returns. Consequently, the literature provides only a partial understanding of how different banking strategies affect overall bank performance.

Methodological Weaknesses in Existing Studies

Most reviewed studies employ quantitative approaches using panel regression techniques, fixed effects models, generalized least squares, DEA, or stochastic frontier analysis. While these methods are appropriate for banking studies, several methodological limitations emerge.

First, many studies use broad samples of banks without distinguishing between listed and unlisted banks, despite differences in governance quality, disclosure

standards, and regulatory scrutiny. Listed banks are more transparent and market-driven, making them a more appropriate context for studying diversification and returns.

Second, several studies are conducted in developed economies or Asian countries such as China, Vietnam, Indonesia, Germany, and Brazil. The institutional, regulatory, and economic environments in these countries differ significantly from Ghana, limiting the generalizability of findings.

Third, earlier Ghanaian studies mainly focused on diversification and profitability without incorporating moderating variables such as market power, business models, or market concentration. Yet banking competition and market structure may significantly influence how diversification affects returns and stability.

Finally, most studies adopt static models that fail to account for dynamic banking behavior and changing macroeconomic conditions, especially after banking reforms and financial crises.

Overall, the literature demonstrates that loan portfolio diversification remains a contentious issue in banking research. While traditional banking theory advocates diversification as a mechanism for reducing credit risk, corporate finance theory emphasizes specialization and industry expertise as drivers of superior returns and lower default risk. Empirical evidence remains mixed, with some studies reporting positive effects of diversification on bank stability and others finding negative or insignificant relationships.

The literature further indicates that business models and market structure may influence the effectiveness of diversification strategies. However, the interaction between loan portfolio diversification, business models, market power, and bank returns remains insufficiently explored, particularly within Ghana's banking industry.

Moreover, despite major reforms in Ghana's banking sector, limited empirical studies focus specifically on listed commercial banks and how their diversification strategies influence returns under varying competitive conditions. Existing studies also inadequately integrate diversification theory, market structure, and business model perspectives into a single analytical framework.

Therefore, the present study contributes to the literature by examining the effect of loan portfolio diversification on bank returns while incorporating business models and market power within the context of listed commercial banks in Ghana. By focusing on an emerging economy and a post-reform banking environment, the study seeks to

provide updated empirical evidence and deepen understanding of how diversification strategies influence banking performance.

Research Hypotheses Development

Based on the reviewed literature, theoretical foundations, and identified research gaps, the following hypotheses are formulated for the study:

H1: Loan portfolio diversification has a significant effect on bank returns among listed commercial banks in Ghana. This hypothesis is grounded in the conflicting empirical evidence regarding whether diversification improves profitability and stability or weakens monitoring efficiency and returns.

H2: Business models have a significant effect on bank returns among listed commercial banks in Ghana. This hypothesis is based on the argument that diversified banking activities, including interest and non-interest income strategies, influence profitability and operational performance.

H3: Market power has a significant effect on bank returns among listed commercial banks in Ghana. This hypothesis stems from the market structure literature suggesting that banks with greater market power may achieve superior profitability through pricing advantages and competitive positioning.

Moderating/Interaction Hypotheses

H4: Business models significantly moderate the relationship between loan portfolio diversification and bank returns among listed commercial banks in Ghana.

This hypothesis reflects the literature suggesting that the effectiveness of diversification strategies may depend on how banks structure their operational and revenue-generation activities.

H5: Market power significantly moderates the relationship between loan portfolio diversification and bank returns among listed commercial banks in Ghana.

This hypothesis is derived from the argument that the impact of diversification on returns may differ between highly concentrated and competitive banking markets.

2.5 Conceptual Framework

This conceptual framework seeks to link how business models and market power play a contributing role in loan portfolio diversification and bank returns. The conceptual framework of the study was developed based on the diagram below.

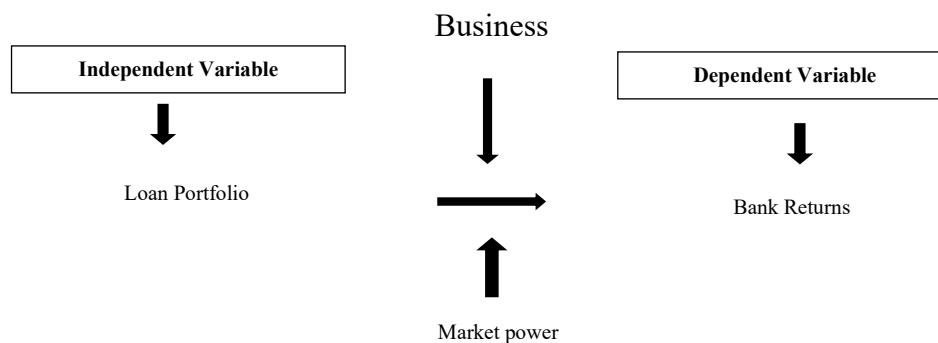


Figure 2.1: Conceptual Framework

3. Methodology

3.1 Data

This research study adopts the use of secondary sources of data. The data got for this study are secondary available financial data contained in the published financial statements from the period 2013 and 2022. These data were computed personally from annual financial reports of respective banks available on the website of Annual Report Ghana, specifically the Ghana Stock Exchange database and the annual banking sector reports by the Bank of Ghana.

The study focuses on listed commercial banks on the Ghana Stock Exchange over the study period. Although eight (8) commercial banks were listed during the period under consideration, the study purposively selected five (5) banks based on data availability, consistency of financial reporting, and continuity of operations throughout the study period from 2013 to 2022.

The use of purposive sampling is justified because not all listed banks possessed complete and consistent annual financial data required for the measurement of loan portfolio diversification, business models, market power, and bank returns. Some banks experienced mergers, acquisitions, restructuring, delisting, or incomplete disclosure of relevant financial information during the study period, which could compromise the reliability and comparability of the panel dataset.

Furthermore, the selected five banks represent the dominant and consistently operating listed commercial banks within Ghana's banking industry and account for a

substantial proportion of the industry's total assets, deposits, loans, and market activities. Consequently, the sample adequately captures the characteristics and operational dynamics of listed commercial banks in Ghana.

The sample size is also considered appropriate for panel data analysis because the study covers a ten-year period, generating sufficient observations for robust econometric estimation. According to methodological literature, panel studies may rely on relatively smaller cross-sectional units when longitudinal observations are adequate and the selected sample is information-rich and representative of the target population.

Therefore, the selection of five listed commercial banks ensures data reliability, consistency, and validity while providing meaningful empirical evidence on the relationship between loan portfolio diversification and bank returns in Ghana.

3.2 The Study Variables

The variables employed in this empirical investigation are discussed in this section. These comprise the independent variable (loan portfolio diversification), the control variable (market power), and the dependent variable (returns on commercial banks). The following sub-sections provide a concise summary of these ideas and actions.

3.3 Dependent Variable of the Study

Commercial banks' returns constitute the dependent variable of the study and are measured using accounting-based performance indicators. Accounting-based measures evaluate a bank's financial performance using information obtained from its financial statements. According to Daily and Dalton (2003), these indicators reflect the current financial condition and operational outcomes of the bank. The most commonly used accounting-based measures of bank performance are Return on Assets (ROA) and Return on Equity (ROE).

Return on Assets (ROA) measures how efficiently a bank utilizes its total assets to generate profits. In banking studies, ROA is generally calculated using net profit after tax rather than Earnings Before Interest and Tax (EBIT), because interest expense is a core component of banking operations and should not be excluded from profitability measurement. Therefore, ROA is expressed as:

$$\text{ROA} = \text{Net Profit After Tax} / \text{Total Assets}$$

ROA indicates management's effectiveness in utilizing the bank's asset base to generate earnings and is widely regarded as a key measure of operational efficiency

and profitability in the banking sector. According to Gitman and Zutter (2012), Return on Equity (ROE) measures the returns generated on shareholders' investments. It reflects the profitability attributable to shareholders based on the equity financing provided to the bank. ROE is commonly used to assess how effectively management employs shareholders' funds to generate profits. Consistent with standard financial and banking literature, ROE is calculated as:

$$\text{ROE} = \text{Net Profit After-tax} / \text{Shareholders equity}$$

ROE serves as an important indicator of shareholder value creation and overall financial performance.

In addition to ROA and ROE, some studies also use Return on Investment (ROI) or Return on Capital Employed (ROCE) as broader measures of organizational performance. Return on Investment evaluates the profitability generated relative to the amount of capital invested in the business. However, in banking studies, ROA and ROE are more frequently preferred because they directly capture banking profitability and align closely with the structure of banks' financial statements. Their extensive use in empirical banking literature also enhances comparability across studies and financial institutions.

Independent Variables of the Study

Loan portfolio diversification is the independent variable for this study. The studies by Behr et al., 2007; Lydia et al., 2017; Tabak et al., 2011, Japan, & Van-Dan, 2020, utilize the Hirschman-Herfindhl Index (HHI) to measure banks' loan portfolio diversification.

a) Hirschman-Herfindhl Index (HHI)

The banking industry's market concentration is assessed using this metric for loan portfolio diversification. Generally, Hirschman-Herfindhl Index (HHI) is measured based on the squares of the relative exposures in terms of lending in the banking sector. That is,

$$\text{HHI} = (\text{Market Share of Bank A})^2 + (\text{Market Share of Bank B})^2 + (\text{Market Share of Bank C})^2 + \dots, (\text{Market Share of Bank N})^2 \dots\dots\dots \text{Equation 1}$$

In this case of the study, the Market Share of banks is based on their lending against the total lending of the banking sector at a given period.

Mathematically, Hirschman-Herfindhl Index (HHI) can also be defined as:

$$HHI_i = \sum_{i=1}^n x^2_{it} \dots\dots\dots \text{Equation 2}$$

where N is the total number of banks providing loans.

3.5 Control Variables

Other intervening variables were used in the study in addition to the dependent and independent variables mentioned above to moderate the variability in how firms perform. To achieve the aim of this study, market power and business model are the control variables utilized.

a) Market Power

The power of the bank to influence market prices by adjusting supply, demand, or both is demonstrated by these metrics. Producers have little control over pricing in markets with perfect or almost perfect competition, forcing them to act as price takers. The market power of the banks will be measured based on the bank's market share in terms of lending.

Mathematically, Market Share can be defined as:

$$\text{Market Share} = \frac{L}{TN} \times 100\% \dots\dots\dots \text{Equation 3}$$

where L is the unit of loan by the bank and TN is the total unit of loan granted by the sector

b) Business model

The business model simulates how bank activities, funding and matching of assets to liability should be done. It provides a rationale on how to observe traditional lending and deposit-taking services of the banks. There are various business models available to the bank in diversifying loan portfolios.

Mathematically, the business model can be defined as:

$$\text{Business models} = \frac{\text{non - interest income}}{\text{total operating income}} \dots\dots\dots \text{Equation 4}$$

Table 3.3 Variables, measurement and sources of data for the study

Variables	Measurement	Sources of Data
Return on Asset	ROA= Earnings before Interest and Tax/Total Assets	Annual Financial Report
Return on Equity	ROE=Earnings before Interest and Tax/Shareholders' Equity	Annual Financial Report
Hirschman-Herfindhl Index (HHI)	$HHI_i = \sum_{i=1}^n x^2_{it}$	Annual Banking sector Report
Market Share	$Market\ Share = \frac{L}{TN} \times 100\%$	Annual Financial Report
Business models	$Business\ models = \frac{non - interest\ income}{total\ operating\ income}$	Annual Financial Report

3.6 Model specification

Regression analysis was utilized to predict the commercial bank's return. It was a suitable analytical method in this study to find out if some relationships existed between independent and dependent variables. Because the study attempted to examine the causal relationship between loan portfolio diversity, market power, and business model variables, regression analysis was appropriate.

Bank returns = $\beta_0 + \beta_1 \text{loan portfolio diversification} + \beta_2 \text{market power} + \beta_3 \text{business model} + \epsilon_i$.

ROA = $\beta_0 + \beta_1 \text{HHI} + \beta_2 \text{market share} + \beta_3 \text{business model} + \epsilon_i$ Equation 5

ROE = $\beta_0 + \beta_1 \text{HHI} + \beta_2 \text{market share} + \beta_3 \text{business model} + \epsilon_i$ Equation 6

This model's specification conforms with previous studies (Nadeem, Zongjun & Shoaib, 2013; Kashif & Sardar, 2013; Siagian, Siregar & Rahadian, 2013) and particularly the quantitative nature of the study.

3.7 Data Analysis

Objective One: The loan portfolio of commercial banks in Ghana from 2015 to 2021 will be analysed with descriptive statistics (that is mean, minimum, maximum and standard deviation).

Objective Two: The returns on commercial banks in Ghana from 2015 to 2021 will be analysed with descriptive statistics (that is mean, minimum, maximum and standard deviation).

Objective Three: The relationship between loan portfolio and bank returns of

commercial banks from 2015 to 2021 will be analysed.

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}} \dots\dots\dots \text{Pearson's correlation coefficient model}$$

Source: Patil (2021)

4. Results and Discussions

4.1 Descriptive statistics

Table 4.1 presents the descriptive statistics of the variables employed in the study. The variables comprising Return on Equity (ROE), Return on Assets (ROA), business model, market power, and loan portfolio diversification were computed from accounting information extracted from the audited annual financial statements of the selected listed commercial banks in Ghana from 2013 to 2022. These descriptive statistics provide preliminary insight into the profitability, diversification behaviour, operational strategies, and market positioning of the sampled banks during the study period.

The findings indicate that the average Return on Equity (ROE) was 0.0388463, representing approximately 3.885%, with a minimum value of -0.08256 and a maximum value of 1.46050. This suggests that, on average, the sampled commercial banks generated relatively low returns from shareholders' equity during the study period. The negative minimum value further indicates that some banks experienced periods of losses or weak shareholder returns, particularly during episodes of financial sector instability and banking reforms in Ghana. However, the positive mean ROE demonstrates that the banks remained moderately profitable overall. These findings are consistent with studies by Dzidzor et al. (2015) and Lydia et al. (2017), who reported relatively modest profitability levels among Ghanaian banks due to regulatory reforms, rising non-performing loans, and operational inefficiencies. Similarly, Sarpong, Winful, and Ntiamoah (2017) found that fluctuations in profitability among Ghanaian commercial banks reflected changing efficiency and market conditions within the banking sector.

Similarly, the average Return on Assets (ROA) was 0.0071451, representing approximately 0.7145%, with values ranging from -0.00440 to 0.05058. This implies that the sampled banks generated less than one pesewa of profit from every cedi of assets employed during the study period. Although the ROA values are positive on average, the relatively low magnitude suggests limited efficiency in utilizing assets to generate earnings. The negative minimum value also indicates that some banks experienced periods of operational losses. These findings align with prior empirical

studies such as Japan and Van-Dan (2020), who reported that diversification strategies in commercial banks were associated with lower profitability indicators, including ROA and ROE. The results are also consistent with Chen et al. (2014), who found that while diversification may reduce risk exposure, it can simultaneously suppress bank returns due to increased monitoring and operational costs.

Regarding loan portfolio diversification, the study employed the Hirschman-Herfindahl Index (HHI) to measure the extent of diversification across loan portfolios. The average HHI value was 0.3746610, or 37.466%, with values ranging from -0.54100 to 3.88900. The findings suggest that the sampled commercial banks maintained a moderate degree of loan portfolio diversification during the study period. This implies that banks spread their lending activities across different sectors and customer groups in an attempt to reduce concentration risk and improve financial stability. The positive diversification levels support the argument of traditional banking theory that diversification helps minimize idiosyncratic credit risk. The findings are comparable to those of Meutia and Chalid (2021), who observed that banks diversify their loan portfolios to reduce sector-specific risks, although the effect on stability may vary depending on market conditions. Likewise, Stefania, Markus, and Gerhard (2009) found that diversification reduces bank risk even though it may not necessarily enhance profitability.

The descriptive statistics further show that the business model variable recorded an average value of 3.3721129, with a minimum value of -2.46066 and a maximum value of 7.58658. The positive average value indicates that the sampled banks actively combined interest-generating and non-interest-generating activities as part of their operational strategies. This suggests that banks increasingly relied on diversified income streams to strengthen profitability and reduce dependence on traditional lending activities. The findings support the modern banking literature, particularly Huynh and Dang (2021), who argued that combining traditional and non-traditional banking activities enhances financial resilience and profitability. Similarly, Tuan (2020) noted that diversified banking business models improve returns while reducing vulnerability associated with overreliance on interest income.

The results also reveal that market power recorded an average value of 2.8868630, with values ranging from -0.87883 to 6.86713. This indicates that the sampled commercial banks possessed moderate market power within Ghana's banking industry. The positive average value suggests that the banks maintained a relatively strong competitive position in loan creation and financial intermediation. These findings support market structure theories which argue that banks with stronger market power are able to achieve superior profitability through pricing advantages and customer retention. The findings are consistent with Meutia and Chalid (2021), who found that market concentration influences bank stability and diversification outcomes. The results

also align with Tabak, Fazio, and Cajueiro (2011), who observed that banks operating in concentrated markets often experience improved returns and reduced risk exposure.

Overall, the descriptive statistics suggest that listed commercial banks in Ghana maintained positive but relatively modest profitability levels during the study period, while simultaneously pursuing moderate loan portfolio diversification strategies, diversified business models, and competitive market positioning. The findings reinforce prior empirical evidence that banking profitability and diversification outcomes are influenced by operational strategies, market structure, and the broader regulatory environment.

Table 4.1 Descriptive statistics

	Minimum	Maximum	Mean	Std. Deviation
Return on Asset	-.00440	.05058	.0071451	.01147228
Return on Equity	-.08256	1.46050	.0388463	.20720221
Hirschman-Herfindahl Index	-.54100	3.88900	.3746610	.68908640
Market Power	-.87883	6.86713	2.8868630	1.92004035
Business Model	-2.46066	7.58658	3.3721129	2.51058740
Valid N (listwise)	50			

Sources: Author's Survey (2026)

4.2 The Influence of Business Model on Loan Portfolio Diversification and Banks' Returns

The findings of the study indicate that the business model exerts a positive and statistically significant influence on banks' returns, particularly Return on Equity (ROE). The descriptive statistics reveal that the business model variable recorded an average value of 3.3721129 percentile units, suggesting that the sampled commercial banks actively combined traditional interest-generating activities with non-interest income activities to enhance profitability and reduce operational risk. Banks with stronger business model scores, especially those closer to the maximum value of 7.58658 percentile units, appear to possess a greater capacity to diversify their sources of income and optimize financial performance.

This finding supports the modern banking literature, which argues that diversified banking business models improve profitability, resilience, and operational sustainability. Huynh and Dang (2021) contend that banks that combine interest-bearing and non-interest-bearing activities are less vulnerable to fluctuations in lending income and customer deposit withdrawals, thereby improving financial stability and profitability. Similarly, Tuan (2020) observed that diversified business models enable banks to enhance returns while simultaneously reducing exposure to concentration and liquidity risks.

The results are also consistent with the financial intermediation theory, which suggests that banks capable of generating multiple streams of income are more likely to achieve superior financial performance because they can spread risks across different operational activities. By diversifying banking operations, commercial banks are able to stabilize earnings, improve efficiency, and strengthen their competitive advantage in the market.

Furthermore, the findings reinforce empirical evidence from Gafrej and Boujelbéne (2021), who found that performance and diversification strategies significantly influence banking operations and profitability, particularly in periods of financial stress. The positive relationship between business models and bank returns also aligns with studies emphasizing that non-interest income activities such as electronic banking services, investment activities, and fee-based services contribute significantly to bank profitability in modern financial systems.

Overall, the findings suggest that a well-structured and diversified business model enhances banks' ability to generate higher returns while improving operational flexibility and financial sustainability. Thus, commercial banks in Ghana can improve profitability by effectively integrating traditional lending activities with alternative revenue-generating services.

The Influence of Market Power on Loan Portfolio Diversification and Banks' Returns

The study further reveals that market power has a positive and statistically significant influence on both loan portfolio diversification and banks' returns. The average market power score of 2.8868630 percentile units suggests that the sampled commercial banks possess moderate competitive strength within Ghana's banking industry. This competitive position appears to enhance their ability to diversify lending activities and improve profitability.

Influence on Loan Portfolio Diversification

The positive relationship between market power and loan portfolio diversification indicates that banks with greater market dominance are better positioned to extend credit across a broader range of sectors and market segments. Using the Hirschman-Herfindahl Index (HHI), the study found an average diversification level of 0.3746610 percentile units, implying moderate diversification among the sampled banks.

These findings are consistent with Meutia and Chalid (2021), who reported that banks operating in more concentrated markets possess greater flexibility and capacity to diversify their loan portfolios due to stronger market influence and enhanced access to borrowers. Similarly, traditional banking theory suggests that banks with stronger

market positions can diversify lending activities more effectively because they possess better information systems, stronger customer networks, and improved monitoring capabilities.

The findings also support the argument that banks with higher market power may enjoy economies of scale and superior screening abilities, enabling them to allocate credit efficiently across sectors while minimizing default risk. Consequently, market power may strengthen banks' ability to manage portfolio risk through broader loan diversification strategies.

Influence on Bank Returns (ROE)

The findings further reveal a positive and statistically significant relationship between market power and Return on Equity (ROE), whose average value was 0.0388463 percentile units. This implies that banks with stronger market power tend to generate higher returns to shareholders.

The results are consistent with the Structure-Conduct-Performance (SCP) theory, which argues that firms operating in concentrated markets can achieve superior profitability due to reduced competition, pricing advantages, and greater market control. Similarly, Tabak, Fazio, and Cajueiro (2011) found that banks with stronger market concentration experienced improved returns and lower risk exposure because they could negotiate favorable lending terms and exploit profitable investment opportunities.

The findings also align with empirical evidence from banking studies in emerging economies, which suggest that market power enables banks to improve interest margins, enhance operational efficiency, and strengthen profitability. Banks with stronger market positions may also attract more deposits, command customer loyalty, and access profitable lending opportunities, thereby improving overall financial performance.

In summary, the study demonstrates that market power contributes positively to both loan portfolio diversification and bank returns among listed commercial banks in Ghana. Banks with stronger market influence appear better able to diversify lending activities across sectors while simultaneously generating higher shareholder returns. These findings reinforce the view that market structure and competitive positioning play important roles in shaping banks' diversification strategies and financial performance.

4.4 The relationship between loan portfolio and bank return

The descriptive statistics provide an initial indication of the behavioural patterns of loan portfolio diversification and bank returns among the sampled commercial banks.

Specifically, the mean value of the Hirschman–Herfindahl Index (HHI) is 0.3746610, suggesting a moderate level of loan portfolio diversification across the banks, while the average Return on Equity (ROE) of 0.0388463 (approximately 3.885%) reflects relatively modest profitability over the study period.

Although these results do not explicitly establish the direction or strength of the relationship between loan portfolio diversification and bank returns, the observed values are consistent with the mixed empirical evidence documented in prior studies. For instance, Dzidzor, Agbloyor, and Aboagye (2015) and Lydia et al. (2017) found no significant positive relationship between loan portfolio diversification and bank profitability in Ghana, suggesting that diversification alone does not automatically translate into improved returns. Similarly, Japan and Van-Dan (2020) reported that diversification may even reduce bank performance when measured using ROA, ROE, and net interest margin, implying that the benefits of diversification may be offset by increased monitoring costs and inefficiencies.

In contrast, Chen et al. (2014) and Stefania, Markus, and Gerhard (2009) provide evidence that while diversification can reduce risk, it may also lead to lower returns, supporting the notion that the relationship between diversification and profitability is often trade-off based rather than strictly positive. These findings align with the corporate finance theory perspective, which argues that excessive diversification may weaken specialization advantages and reduce efficiency in credit assessment and monitoring.

At the same time, other studies such as Tabak, Fazio, and Cajueiro (2011) and Nadya, Memmel, and Pfungsten (2013) suggest that more concentrated lending strategies may enhance profitability, implying that the effect of diversification on returns is highly context-dependent and influenced by institutional and market conditions.

Given this inconsistency in prior empirical findings, the current descriptive results—showing moderate diversification alongside relatively low profitability—reinforce the argument that the relationship between loan portfolio diversification and bank returns is not straightforward. Instead, it is likely to be influenced by intervening factors such as market structure, business model orientation, regulatory environment, and managerial efficiency.

Therefore, as correctly noted, descriptive statistics alone are insufficient to determine the nature or significance of the relationship between these variables. More robust inferential techniques, particularly correlation and panel regression analysis, are necessary to establish the direction, magnitude, and statistical significance of the effect of loan portfolio diversification on bank returns. This approach is consistent with methodological practices in prior studies such as Meutia and Chalid (2021) and Gafrej

and Boujelbéne (2021), who relied on econometric models to uncover nuanced relationships that descriptive analysis could not reveal.

4.5 Correlation Analysis

The research study adopted a correlation analysis to create the link between the dependent variables, independent variables and control variables. simple regression model to analyse the research hypothesis of this study. Table 4.5 affirms the linkage developed by the researcher to explain this research study. The results revealed that with the control of the market power and business model available to the commercial banks, there is a positive influence between the loan portfolio and banks' return. Even though there is a positive relationship between loan portfolio and bank return, its relationship is not statistically significant. This is because the influence between the commercial bank's loan portfolio and their ability to generate income with shareholders' equity is 18.3% (Under the controlling variable of market power and business model). In addition, the influence between the commercial bank's loan portfolio and its ability to generate income with its assets is 2.3% (Under the controlling variable of market power and business model).

Table 4.2: Correlation Analysis

Control Variables			Hirschman-Herfindhl Index	Return on Equity	Return on Asset
Business Model & Market Power	Hirschman-Herfindhl Index	Correlation	1.000	.183	.023
		Significance (2-tailed)	.	.214	.878
		df	0	46	46

a. Indeopendent variable = Loan Portfolio (Hirschman-Herfindhl Index)

b. Dependent variable = Bank Return (Return on Asset, Return on Equity)

c. Control variables = Market Power, Business Model

Sources: SPSS survey (2026)

The summary of the correlation analysis testing in Table 4.5, revealed that the conceptual framework developed by the researcher for this research study is accurate and reliable for explaining the concept of this study.

4.6 Regression Analysis

In order to forecast the return of the commercial bank, regression analysis was used. The analytical approach used in this study to determine whether there were any correlations between the independent and dependent variables was appropriate. The study's goal of examining the causal relationship between loan portfolio diversity, market power, and business model characteristics made regression analysis appropriate.

Bank returns = $\beta_0 + \beta_1 \text{loan portfolio diversification} + \beta_2 \text{market power} + \beta_3 \text{business model} + \epsilon_i$.

Statistically

$$\text{ROA} = \beta_0 + \beta_1 \text{HHI} + \beta_2 \text{MP} + \beta_3 \text{BM} + \epsilon_i \dots \text{Model 1}$$

$$\text{ROE} = \beta_0 + \beta_1 \text{HHI} + \beta_2 \text{MP} + \beta_3 \text{BM} + \epsilon_i \dots \text{Model 2}$$

Table 4.6 shows the results of the regression analysis between the dependent variable (Return on Asset) and the independent variables (loan portfolio diversification, market power, and business model) from 2013 to 2022.

$$\text{ROA} = \beta_0 + \beta_1 \text{HHI} + \beta_2 \text{MP} + \beta_3 \text{BM} + \epsilon_i \dots \text{Model 1}$$

The table revealed an R Square value (0.014 percentile unit or 1.4%) indicating a positive regression model but not statistically significant.

Table 4.3: Regression Analysis on Model 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.118 ^a	.014	-.050	.01175708

a. Predictors: (Constant), Business Model, Hirschman-Herfindahl Index, Market Power

Sources: SPSS survey (2026)

Table 4.7 displays the findings of the regression study between the independent factors of loan portfolio diversification, market power, and business model from 2013 to 2022 for the dependent variable of return on equity.

$$\text{ROE} = \beta_0 + \beta_1 \text{HHI} + \beta_2 \text{MP} + \beta_3 \text{BM} + \epsilon_i \dots \text{Model 2}$$

The table revealed an R Square value (0.109 percentile unit or 10.9%) indicating a positive regression model but not statistically significant.

Table 4.4: Regression Analysis on Model 2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.330 ^a	.109	.051	.20188976

a. Predictors: (Constant), Business Model, Hirschman-Herfindahl Index, Market Power

Sources: SPSS survey (2026)

4.5 Diagnostic Test

To successfully carry out the stationary of the basic regression model used for testing the hypothesis in Tables 4.8 and 4.9, a regression diagnostics test model was selected. This diagnostic test was carried out to confirm if the assumptions of logistic regressions met all the variables. For instance, if the assumption on the variance between the residuals and regression estimates is constant or not constant. The analysis of variance in the study shows reliability and accuracy. This is accomplished by taking into account both the residual mean value and the regression mean square value of the model. The model is considered accurate and dependable for predicting variables when the regression mean square value is greater than the residual value. The regression means square and the residual mean square are obtained by dividing each of the sums of square by the degree of freedom respectively. By dividing the regression mean square value by the residual mean square, the f value used in the analysis of the variance table is determined.

Table 4.8 represents the Significance (Sig), Freedom (F) and the mean of square (ms) on the variables (cedi depreciation and consumption of basic food items) for the study. The table shows that the significance (Sig) value is 0.883 (more than 0.00), the freedom (F) value is 0.218, the mean of square (ms) value for regression and residual is 0.000 and 0.000, respectively, and the freedom (F) value is 0.883 (greater than 0.00). The mean of square (ms) value indicates that regression is equal to residual.

Table 4.5: ANOVA on Model 1

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	3	.000	.218	.883 ^b
	Residual	.006	46	.000		
	Total	.006	49			
a. Dependent Variable: Return on Asset						
b. Predictors: (Constant), Business Model, Hirschman-Herfindhl Index, Market Power						

The summary of the ANOVA in Table 4.8, shows that the regression model adopted is accurate and reliable for predicting variables. (bank return, loan portfolio diversification, market power and business model variables). This is because the regression means square value is equal to the residual value making the model accurate and reliable.

Table 4.9 represents the Significance (Sig), Freedom (F) and the mean of square (ms) on the variables (cedi depreciation and consumption of basic food items) for the study. From the table, the Significance (Sig) value is 0.148 (Which is greater than 0.00), the Freedom (F) value is 1.871, mean of square (ms) value for regression and residual are 0.076 and 0.041 respectively. The mean of square (ms) value indicates that regression is greater than residual.

Table 4.6: ANOVA on Model 2

Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	.229	3	.076	1.871	.148 ^b
	Residual	1.875	46	.041		
	Total	2.104	49			

a. Dependent Variable: Return on Equity

b. Predictors: (Constant), Business Model, Hirschman-Herfindahl Index, Market Power

Sources: SPSS survey (2026)

The summary of the ANOVA in Table 4.9, shows that the regression model used adopted is accurate and reliable for predicting variables. (bank return, loan portfolio diversification, market power and business model variables). This is because the regression means the square value is greater than the residual value making the model accurate and reliable.

5. Summary of Findings

This study assessed loan portfolio diversification and bank returns

5.1 The influence of the business model on the loan portfolio and banks' return

The results of the study on the impact of the business model on the loan portfolio and banks' return showed that, from 2013 to 2022, the business model had a favourable impact on both. Although the effect is favourable, it is not statistically significant.

5.2 The influence of the market power on the loan portfolio and banks' return

The findings of the study on the impact of market power on the loan portfolio and banks' return showed that, from 2013 to 2022, market power has a favourable impact on both. Although the effect is favourable, it is not statistically significant.

5.3 The relationship between loan portfolio and bank returns of commercial banks from 2013 to 2022

According to research on the relationship between commercial banks' loan portfolios and bank returns, the loan portfolio has a 21% impact on a bank's capacity to generate income from its shareholders' equity and a 2.8% impact on its capacity to generate income from the assets it uses for its banking operations. Loan portfolio and bank return do have a positive correlation; however, this link is not statistically significant.

5.4 Conclusion

Loan portfolio diversification enables banks to cut operating costs and specific risk while reducing monitoring requirements. Diversifying your loan portfolio will give you access to cost and geographic savings. In reality, the higher risk that comes with diversification is what leads to the majority of banking crises. According to Rossi et al. (2019), loan portfolio quality and monitoring are to blame for the subpar results of loan portfolio diversification. Some banks lack experts on how to diversify their loan portfolios. The fact Because managers may be risk averse, they incur costs in searching for how to diversify the high quality of loans.

Loan portfolio diversification affects banks' returns in the sense that, it allows banks to optimise their asset and financing by matching bank assets and liabilities. That is, diversifying loan portfolios allows a complementary measure of bank returns through the reflection of the size of bank credits. Banks' revenues are protected through loan portfolio diversification. This study assesses loan portfolio diversification and bank returns. This study comes to the conclusion that diversifying the loan portfolio positively and statistically significantly affects the bank's returns.

5.5 Recommendation

Based on the findings, the recommendations presented below include;

to stop the reasons why loan quality is declining. It is advised that management and business regulators stress the significance of establishing thorough regulatory requirements for bank-wide risk management. An essential first step in this direction is the Basel regulatory framework, which is more risk-sensitive and specifically includes a supervisory review procedure. It is advised that banks with systemic importance totally avoid non-deposit funding and non-interest income creation. This is because the absence of systemic banking the diversification benefits are weak. The safest and soundest approach to conduct investment banking activity may be to adopt a systemic banking model, however there may be a limit to how far banks can deviate from the conventional model of interest revenue production and deposit-taking. In order to ensure that there is enough money available for the day-to-day operations of the company, financial managers should also assure the practical and sensible management of their working capital. Existence of cash would lessen the need for debt.

5.6 Policy Recommendations

Given the final influence on the firm's performance, policymakers and decision-makers can play a crucial role in ensuring that leverage risk concerns are part of the criteria that firms employ when making financing decisions. While numerous interventions and initiatives have been made to provide the necessary credit support so

that commercial banks listed on the Ghana Stock Exchange prosper and increase their operational capacity, efficiency, and productivity, there are comparatively few or scant studies that assess how their capital structure affects their profitability.

The Central Bank of Ghana should implement steps to manage or diversify loan portfolios within the industry by implementing a sub-prime strategy, according to the study's major policy suggestion. The sub-prime crisis served as a means of imposing restrictions on industries with higher systemic risk in order to prevent non-performing loans. Regulators and politicians in other emerging economies should take this technique seriously.

From the perspective of regulators, managing risk is more crucial than focusing on the banking sector's high profits in order to guarantee financial stability. Large banks, which are less susceptible to risk, might be relatively concentrated, especially on areas in which they have experience, in order to lower costs and increase returns. This will have a negative effect on bank profits.

5.7 Suggestions for Future Research

In Ghana, there are relatively few studies that evaluate loan portfolio diversification and bank returns. The study suggests that more variables be included in future research on the subject in order to raise public knowledge of loan portfolio diversification and bank returns. To acquire the result with better precision while avoiding bias tendency, supporting data from additional research should be taken into consideration, such as interviews.

References

- Acharya, V. V., Hasan, I., & Saunders, A. (2006). Should banks be diversified? Evidence from individual bank loan portfolios. *Journal of Business*, 79(3), 1355–1412. <https://doi.org/10.1086/500679>
- Acquah, K. K. (2020). Banking sector crisis and ethical corporate governance practice. Retrieved from <https://www.graphic.com.gh/features/opinion/ghana-news-banking-sector-crisis-and-ethical-corporate-governance-practice.html>
- Asante-Gyabaah, G., Oppong, C. N., & Idun-Baidoo, N. (2015). Electronic banking in Ghana: A case of GCB Bank Ltd. *European Journal of Business and Management*, 7(12). ISSN 2222-1905 (Paper), ISSN 2222-2839 (Online)
- Atahau, A. R. D. (2017). Does diversification lead to better loan portfolio returns? Empirical evidence from Indonesian banks. *DLSU Business & Economics Review*, 26(2), 25–40.
- Bank of Ghana. (2020). *2018 annual report*. www.bog.gov.gh. ISSN: 0855-0972
- Behr, A., Kamp, A., Memmel, C., & Pfingsten, A. (2007). Diversification and the banks' risk-return characteristics: Evidence from loan portfolios of German banks.

- Bundesbank Series 2, Discussion Paper No. 2007(05)*. Available at SSRN: <https://ssrn.com/abstract=2793990>
- Chen, Y., Shi, Y., Wei, X., & Zhang, L. (2014). How does credit portfolio diversification affect banks' return and risk? Evidence from Chinese listed commercial banks. *Technological and Economic Development of Economy*, 20(2), 332–352. <https://doi.org/10.3846/20294913.2014.915246>
- Cole, A. R., Moshirian, F., & Qiongbing, W. (2008). Bank stock returns and economic growth. *Journal of Banking & Finance*, 32, 995–1007. <https://doi.org/10.1016/j.jbankfin.2007.07.006>
- Daily, C. M., & Dalton, D. R. (2003). Women in the boardroom: A business imperative. *Journal of Business Strategy*, 24(5), 8–9.
- Dang, V. D. (2019). Should Vietnamese banks need more equity? Evidence on risk-return trade-off in dynamic models of banking. *Journal of Risk and Financial Management*, 12(2), 1–13. <https://doi.org/10.3390/jrfm12020084>
- Demirgüç-Kunt, A., & Huizinga, H. (2020). Bank activity and funding strategies: The impact on risk and returns. *The World Bank Development Research Group Finance and Private Sector Team. Policy Research Working Paper 4837*.
- Dzidzor, A., Agbloyor, E. K., & Aboagye, A. Q. Q. (2015). Bank diversification and stability in Ghana. *(Please verify full publication details if available)*.
- Gafrej, O., & Boujelbéne, Y. (2021). Performance and diversification strategies in banking institutions. *(Please verify full publication details if available)*.
- Gitman, L. J., & Zutter, C. J. (2012). *Principles of managerial finance* (13th ed.). Pearson Education.
- Hayden, E., Porath, D., & Westernhagen, N. V. (2007). Does diversification improve the performance of German banks? Evidence from individual bank loan portfolios. *Journal of Financial Services Research*, 32(3), 123–140. <https://doi.org/10.1007/s10693-007-0017-0>
- Huynh, J., & Dang, V. D. (2021). Loan portfolio diversification and bank returns: Do business models and market power matter? *Cogent Economics & Finance*, 9(1), 1891709. <https://doi.org/10.1080/23322039.2021.1891709>
- Jahn, N., Memmel, C., & Pfingsten, A. (2013). Banks' concentration versus diversification in the loan portfolio: New evidence from Germany. *Deutsche Bundesbank Discussion Papers*.
- Japan, H., & Van-Dan, D. (2020). A risk-return analysis of loan portfolio diversification in the Vietnamese banking system. *Journal of Asian Finance, Economics and Business*, 7(9), 105–115. <https://doi.org/10.13106/jafeb.2020.vol7.no9.105>
- Lydia, A., et al. (2017). Loan portfolio diversification and profitability of banks in Ghana. *(Please verify full publication details if available)*.
- Meutia, I., & Chalid, D. A. (2021). Loan diversification and bank stability in Indonesia. *(Please verify full publication details if available)*.
- Ministry of Finance. (2020). *Macroeconomic performance report 2019*. Economic Strategy and Research Division.

- Ministry of Finance-Ghana. (2018). *Banking sector reforms and recapitalization report*. (Please verify full title if available).
- Nadya, M., Memmel, C., & Pfingsten, A. (2013). Bank concentration versus diversification and performance. (Please verify full publication details if available).
- Patil, A. (2021). Pearson's correlation coefficient model. (Please verify full publication details if available).
- PricewaterhouseCoopers. (2018). *2018 Ghana banking survey*.
- PricewaterhouseCoopers. (2020). *2020 Ghana banking survey*.
- Rahayu, et al. (2020). Banking sector mobilization and economic development. (Please verify full publication details if available).
- Rossi, S. P. S., Schwaiger, M. S., & Winkler, G. (2009). How loan portfolio diversification affects risk, efficiency and capitalization: A managerial behaviour model for Austrian banks. *Journal of Banking and Finance*, 33(12), 2218–2226. <https://doi.org/10.1016/j.jbankfin.2009.05.022>
- Sarpong, D., Winful, E. C., & Ntiamoah, E. B. (2017). Profitability and efficiency of Ghanaian banks. (Please verify full publication details if available).
- Shim, J. (2019). Loan portfolio diversification, market structure and bank stability. *Journal of Banking and Finance*, 104, 103–115. <https://doi.org/10.1016/j.jbankfin.2019.04.006>
- Song, F., & Thakor, A. V. (2007). Relationship banking, fragility, and the asset-liability matching problem. *The Review of Financial Studies*, 20, 2129–2177.
- Stefania, R., Markus, S., & Gerhard, W. (2009). Loan portfolio diversification and bank performance in Austrian banks. (This appears to duplicate Rossi et al. 2009; verify preferred citation).
- Tabak, B. M., Fazio, D. M., & Cajueiro, D. O. (2011). The effects of loan portfolio concentration on Brazilian banks' return and risk. *Journal of Banking and Finance*.
- Taiwo, J. N., Agwu, M. E., Babajide, A. A., Okafor, T. C., & Isibor, A. A. (2016). Growth of bank frauds and the impact on the Nigerian banking industry. *Journal of Business Management and Economics*, 4(12).
- Tuan, N. (2020). Business model diversification and bank profitability. (Please verify full publication details if available).
- World Bank. (2019). Ghana financial sector development report. (Please verify exact title if available).
- World Bank. (2021a). The World Bank in Ghana. Retrieved from <https://www.worldbank.org/en/country/ghana/overview>
- World Bank. (2021b). *World investment report 2021: Investing in sustainable recovery*. ISBN 9789211130171.
- Yibing, C., Xianhua, W., Lingling, Z., & Yong, S. (2013). Sectoral diversification and banks' return and risk: Evidence from Chinese listed commercial banks. *Procedia Computer Science*, 18, 1737–1746.