

Effect of Loan Portfolio Diversification on Risks and Returns: A Study of Selected Banks in Nigeria

Jibrin Shu'aibu Garko, Dosumu Fola & Mujahid Guda Musa

Research, Policy and International Relations Department, Nigeria Deposit Insurance Corporation

ABSTRACT

This study examines the effects of loan portfolio diversification on the risks and returns of listed banks in Nigeria over the period 2009–2020. Data was obtained from 13 sampled banks' annual reports and accounts, as well as CBN statistics. Descriptive statistics and Pearson correlation were used as preliminary tests of the variables, while Pooled OLS and GLS (FE & RE) regression were used to estimate the models of the study due to the panel nature of the data. The findings reveal that diversifying bank lending is more profitable than focusing on a few sectors. It also found that diversifying loans does not significantly increase the risks of banks in Nigeria. The study recommends that banks in Nigeria should diversify their lending to increase returns; at the same time, regulators and supervisors should strengthen risk control measures to ensure financial stability rather than increasing banks profitability. It also recommended that regulatory frameworks aimed at encouraging banks either to specialize or diversify their credit portfolios, should also assess the underlying risk.

1.0 INTRODUCTION

Banks perform a vital role in the economic life of any nation, given that the health of any economy is seemingly related to the quality of its banking system. Though one of the primary duties of banks is to create wealth, however, activities such as borrowing, lending, and other ancillary services have enhanced the process of production, distribution, exchange, and consumption of wealth and, by extension, engendering the banking sector as one of the viable partners in the process of economic development. Traditionally, banks mobilize savings for the sake of lending or investment purposes. The absence of banks implies the inability to mobilise these idle funds in the form of savings. Modern banking services have ventured into areas such as syndicated long-term loan transactions, by virtue of their subsidiaries – capital markets and even insurance businesses, as obtainable with the Holdco structure in the Nigerian financial system. The enquiry into whether it is better for banks to diversify or concentrate their loan portfolio across sectors in the economy is debatable in the financial stability research (Tabak, Fazio and Cajueiro, 2011). The financial crisis also brought to the fore the significance of analysing borrowers' default in credit portfolios in the practices of financial institutions (large-lot borrowers and sector concentration).

As financial intermediaries, banks play an important role in an economy by mobilizing savings, managing risks, and facilitating financial transactions (Salehi, 2008). Management of banks' loan portfolios is essential for the stability of the banking system, given that a significant amount of bank revenue is obtained from interest income earned from lending activities. Arising from the financial crises of 2007/2008, emphasis is now placed on the need for banks to keenly measure and control their credit exposures in order to minimise the resultant credit risk (Basel Committee

on Banking Supervision, 2014). Like any business operation whose aim is to maximize profit, banks may choose to specialize their lending activities in selected economic sectors to leverage their managerial expertise and, by so doing, reduce agency problems (Stomper, 2006). To reduce idiosyncratic risk, banks may also diversify their loan portfolios to spread across different economic sectors (Beck and Jonge, 2013). Regardless of the option adopted, there are implications for bank credit risk and profitability. A wide range of literature on bank finance has tried to address the issue of loan diversification or concentration and its relationship with bank performance and risk. There is no consensus so far, because the findings of different countries differ, with evidence justifying both views.

Recent discussion probes the beneficial effects of concentrating loan portfolios by banks and argues that it increases banks' return and reduces the associated default risk of lending activities due to increased monitoring efficiency and expertise of banks in the sectors they lend to. Likewise, corporate finance theory suggests accrued benefits emanating from banks' concentrating their activities on a few specific sectors that they possess expertise in or are familiar with. The theory is also in line with the fact that aligning monitoring activities to a few sectors yields lower loan loss provisions and higher profitability. Furthermore, it is also augured that because the diversification strategy induces competition, it is less attractive (Winton, 1999; Acharya, Hasan, and Saunders, 2006; Mercieca, Schaeck and Wolfe, 2007; Bove and Pfingsten, 2008; Tabak, Fazio, and Cajueiro, 2011; Raei, Safizadeh and Raei, 2016; and Chen et al., 2013). Besides, another study found that diversified banks are riskier and less profitable (Hayden, Porath and Von, 2007; and Berger, Hasan and Zhou, 2010).

Some researchers like Bebczuk and Galindo (2008) and Stiroh and Rumble (2006) have indicated that risk reduction and performance improvement are obvious advantages of portfolio diversification whereas agency problems are commonly associated disadvantages of portfolio diversification. In the works of Diamond (1984) it was observed that when perfect diversification is followed by delegated monitoring, it enables banks to maximize their gains. This assertion was also followed-up by Hellwig (1998) emphasizing the conditions that when banks concentrate their activities on some large projects or sectors, it lowers their monitoring costs. Studies, such as Goetz (2008), looked at how diversification of a bank's loan portfolio affects its risk-taking behaviour and that of non-diversified, competing banks. The findings indicated that irrespective of the status of the competitors (if they are diversifying or not), a strong association exists between diversification and risk taking. The works of Fang et al. (2011), showed a positive relationship between asset diversification and performance and a negative relationship between loan diversification and bank performance. Furthermore, Basel Committee on Banking Supervision (1991) alluded many banking crises in the past thirty years were caused by concentration of loan portfolio in banks, thus indicating that risk is highly associated with concentration. Research works in Argentina (Bebczuk and Galindo 2008), Japan (Sawada 2011), India (Pennathur *et al.* 2012), as well as Austria (Rossi *et al.* 2009) supported this finding.

Interconnected studies on the impact of loan portfolio diversification on bank performance and risk reveal disparate results, justifying a re-examination of the relationship between loan diversification and bank risk-return. Nevertheless, most of the studies on loan diversification were

carried out in the advanced economies such as US and Europe (Acharya and Hasan, 2001; Stiroh and Rumble, 2006; Yigit, 2012; Cinar et al., 2018; Yang et al., 2019). Only a few studies have been conducted in emerging economies such as Brazil, Argentina, Ghana, Tunisia, and other African countries (Bebczuk and Galindo, 2008; Tabak et al., 2011; Pennathur et al., 2012; Belguith and Bellouma, 2017, Adzobu et al., 2017; Sissy et al., 2017).

In Nigeria, the study of Ihejirika and Aderigha (2021) proxy diversification in terms of treasury bills, ordinary shares, investments in subsidiaries, and foreign investments. Others proxy bank diversification in terms of revenue drive (Oluitan and Balogun, 2018; Rhema, Okoye, and Ambrose, 2021; Oluwaseyi et al., 2021). None of these, however, proximate diversification in terms of sectoral allocation of loan, which the current study looks at.

Even though the study by Adaramola and Ogunsakin (2020) examined the impact of portfolio management on bank performance in Nigeria. However, it used a questionnaire to generate data on loan risk diversification and loan risk monitoring. Also, logit regression analysis was used in arriving at its findings. Contrary to Adaramola and Ogunsakin's study, the current study used secondary data to obtain information on loan portfolio diversification for 13 banks covering 12 years using FE, RE and Pooled OLS estimators, and hence longitudinal in nature, while the study of Adaramola and Ogunsakin is cross-sectional in nature, covering only 5 banks.

Overall, none of the studies using Nigerian banks relate diversification with risk which this study does by indexing risk of the bank with NPL and none has proxy performance using risk adjusted return of assets of bank which this study used. Hence, this study aims at investigating the effect of sectoral loan diversification on risk-return of commercial banks in Nigeria. The research contributes to existing literature on loan portfolio diversification, and it will aid regulators, investors and other stakeholders to appraise the consequences of loan diversification on risk and return of banks. The paper is organised in five sections. In Section 2 theoretical and empirical literature was reviewed and in Section 3 we provide a description of the data and methodology used in the study. The findings of the study were presented in Section 4, and conclusions were drawn in Section 5.

2.0 REVIEW OF RELATED LITERATURE

Whether banks and other financial intermediaries should diversify or specialize in their loan portfolio is a fundamental question in banking. Theoretical frameworks and models have been developed arguing for both strategies, and there is still no consensus among scholars and professionals. The traditional banking model advocates that banks should pursue a diversification strategy and invest across different sectors to reduce the probability of financial distress. On the other hand, theory from corporate finance suggests that firms should adopt a narrower strategy and focus on activities where they possess expertise.

2.1 Risk concentration in banking activity

Risk concentration in specific sectors significantly contributes to the increased instability in banking. While the main focus of this work is on credit risk concentration, the accretion of other risks, or a combination of them together with credit risk, can lead to serious threats, financial

losses, or bankruptcy. The Basel Committee on Banking Supervision (BCBS, 2006) defines risk concentration as "a set of exposures arising in the context of a particular type of risk or as a result of the interaction between various types of risk". Among the significant risks in banking activities is the concentration of credit risk arising from the uneven distribution of credit either to sectors or individual obligors. In lending, concentration risk could either refer to: 1) the vulnerability that a bank's operations face when it holds all or most of its risk assets portfolio in particular economic sectors; 2) the possibility that a bank may be distressed or experience a liquidity crisis, given that its loan portfolio is largely concentrated among a few large borrowers; and 3) the tendency that a bank might fall into crisis given that its loan portfolio is basically made of a few types of credit facilities, which could lead to financial losses that threaten the solvency of the bank. Thus, this risk can be characterized as: 1) Sectorial risks (or systemic risks), i.e., risks arising from concentration in specific economic sectors. 2) Single obligor concentration, i.e., and risk from concentration in individual or related parties.

The first type of concentration arises from the lack of diversification in terms of the industry or geographical area. This risk crystallizes with the deterioration of the economic situation in the given sectors of the economy or administrative regions of the country in which the loan is concentrated or in respect of which the bank has adopted an unduly high exposure (Kozak, 2015). The second type of risk stems from the considerable involvement of the bank in a small group of large borrowers. One of the methods deduced to reduce such risk is the granularity of the investment portfolio. The Deutsche Bundesbank examined concentration risk in the banking sector from both a macroeconomic and a microeconomic standpoint in 2006. From financial stability (macro perspective), the risk arises from failures of many banks that are exposed to debtors operating in some sectors or segments. Such a situation may downgrade the stability of many banks, especially if it has to do with the systemically important banks in the economy, and could as well hamper the economic growth of the country. The risk concentration in a single bank (micro perspective) may arise in terms of a single borrower or obligor; in a single or few segments of the economy, and arising from a possible contamination of risk (financial contagion).

Arising from various transmission channels, adverse disruption in the operation of one or a group of firms that make up a sector can extend over the entire sector and pose a threat to one or more banks. The concentration of credit risk in a given loan portfolio is associated with the uneven distribution of loan portfolio exposure of banks. Concentration ratios are often used in its estimation and are commonly applied in assessing the degree of market concentration (Hoffman, 1984). The frequently used measures of credit risk concentration include concentration ratios, the Herfindhal-Hirschman Index (HHI), and weighted concentration ratios (Avila et al., 2012)

2.2 Traditional banking theory

Conventionally, in financial intermediation and banking theories, it is argued that when banks spread their loan portfolio across several geographical regions and industries, it gives room for their diversification of risk in the banking books. By diversifying loans across regions and diverse industries into organizations with different risk profiles, it reduces the bank's risk exposure and the impact of shocks arising from any particular industry or sector on the bank. Given that the banking business is highly geared, this necessitates the importance of diversification to minimise

risk. Moreover, banks' role as monitors is an essential element in the literature for explaining the benefits of diversification. Traditional wisdom in conventional banking theory argues that a bank's loan portfolio diversification has a tendency to reduce credit risk and improve the financial performance of banks through an increasing reduction in risk as the loan portfolio is spread across loan borrowers in different sectors or industries. Some studies, such as Diamond, (1984), suggest a positive association between the diversification of loan portfolios and bank profitability (Stiroh and Rumble, 2006; Bebczuk and Galindo, 2008). The asserted positive link that exists between loan portfolio diversification and bank performance is largely attributed to the fact that when a bank increases lending activities to new economic sectors or industries, it is expected that the probability of default of the loans would reduce given the increase in the quality of its credit portfolio. It was further argued that the more diversified a credit institution is, the less vulnerable it would be to economic downturns arising from a single economic sector.

Chiorazzo et al. (2008) studied some Italian banks. Their study showed that loan portfolio diversification increases the bank's risk-adjusted returns. However, the gains attributed to diversification tend to reduce as the banks get larger (Chiorazzo et al., 2008). Other studies, such as Cotugno and Stefanelli (2012), also confirmed the positive relationship existing between a bank's product or loan diversification and the financial performance of the bank. In terms of geographical diversification, the same linkage was also observed, that as banks spread geographical concentration, risk-adjusted returns also increase. In the work of Stiroh (2004a), the link between loan portfolio diversification and risk-adjusted returns for community banks showed that diversification has strong benefits within broad activity classes but not between them. An assessment of the banking system in Brazil was carried out to determine the level of concentration or diversification of their credit portfolio and how it impacts on performance and risk. It was observed that Brazilian banks' loan portfolios were more concentrated relative to those of developed countries like the US, Germany, and Italy (Tabak et al. 2011). Similar studies were carried out in Argentina and it was observed that larger banks benefited more from sectoral or loan portfolio diversification than smaller banks, and these benefits of diversification were greater during the downside period of the business cycle (Bebczuk and Galindo, 2008). Among developing economies, Sanya and Wolfe (2011) studied the effect of a bank's revenue diversification on performance and risk and found that diversification enhances profitability and decreases insolvency risk.

Diversification of loan portfolios does not guarantee a reduction in the risk of any bank failing or better performance. Hence, the reason for enhancing loan monitoring. The lack of expertise hypothesis opines that if management lacks the required time/expertise needed to monitor the loan evaluation and appraisal process for new or existing customers, segments, or industries effectively, further diversification does not readily imply less provisioning. The loan's quality may be a second reason why the level of diversification does not necessarily imply a reduced need for provisioning. For example, when a bank has a less diversified portfolio that is focused on low-risk activities or sectors, the required provisioning would be lower than that of a bank with a highly diversified portfolio filled with highly risky assets or sectors. Proponents of the focus principle argue that diversification could lead to diversified banks suffering from diluting the comparative advantage they have by going beyond their existing expertise through

diversification, which invariably induces competition (Winton, 1999), and resultant increased agency costs (Berger et al., 2010). The ultimate guideline, however, on whether diversification pays off or not in terms of efficiency is to look at the link between diversification and profit efficiency.

2.3 Corporate finance theory

Theories in corporate finance advocate that firms should concentrate their activities in a few specific sectors in order to utilize their competence and expertise in their area of expertise. Denis, Sarin and Denis (1997) argued that firms should specialize in order to reduce the antecedent value-destructive effects arising from diversification strategies produced by agency problems. To reduce risk arising from agency problems, banks do have to screen out bad credit risks. According to Mishkin et al. (2013), the benefits of specialized banks include gaining a competitive advantage in the collection of information and, by extension, capacity as they become well-informed about specific customers and industries. Thus, the bank can perform a more efficient screening and monitoring process, which ultimately reduces overall risk.

The corporate finance model, contrary to traditional banking theory, argues that increasing diversification of a bank's credit portfolio would reduce profitability, i.e., profitability is negatively associated with the profitability of banks. The corporate finance theory states that banks should use the benefits of expertise they have and concentrate their lending activities on a specific sector or group of sectors. Thus, given their knowledge of how business in specific sectors should be, by concentrating on these specific sectors, banks can then utilize their core skills or knowledge to better scrutinize their portfolio, deal with credit risks, and thus reduce costs arising from asymmetric information. (Jensen, 1986; Meyer and Yeager, 2001; Kamp et al., 2007; Hayden et al., 2007; Berger et al., 2010; Chen et al., 2013). In particular, Winton (1999) argues that diversification only reduces the chances of bank failure in the case of moderated risks of default. When the risks are low, banks may benefit more from specialization than from diversification, since there is a low probability of failure. Conversely, when the probabilities of insolvency are high, diversification may even worsen the situation since the bank will expose itself to many sectors, and the downturn of just one may be enough to lead the bank to bankruptcy.

In conclusion, the existing banking literature does not provide consensus as to the question of whether banks should diversify portfolios in geographic regions or should they specialize. Instead, there is evidence to support both arguments. Traditional arguments suggest that banks should be as diversified as possible, as banks are typically highly leveraged, and diversification across sectors reduces their chance of costly financial distress or bankruptcy. Diamond, (1984); and Sanya and Wolfe (2011) argue that diversification makes it cheaper for institutions to gain credibility in their roles as screeners or monitors of borrowers. On the other hand, some studies (Jensen, 1986; and Chen et al., 2013) argue and/or provide evidence that financial institutions should focus on a single line of business so as to take greatest advantage of management's expertise and reduce agency problems, leaving investors to diversify on their own. Overall, the main issue is whether banks should diversify or focus, and the effect on the financial performance of the bank still remains an on-going debate in the diversification/focus literature.

2.4 Review of Empirical studies

Many studies were carried out to examine the effect of loan diversification on bank return and risk. Acharya and Hasan (2001) empirically assessed the effect of focus vs. diversification on the return and the risk of banks using data from 105 Italian banks over the period 1993–1999 and found that industrial loan diversification reduces bank return while endogenously producing riskier loans for all banks. Sectoral loan diversification only produces an inefficient risk–return trade-off for banks with very high levels of risk. Geographical diversification, on the other hand, does result in an improvement in the risk–return trade-off for banks with low levels of risk. Overall results suggest that diversification of bank assets is not guaranteed to produce better performing, efficient, and/or safer banks. Stiroh and Rumble (2006) investigate the association between bank diversification, risk, and profitability of banks in the U.S. They find that non-interest-based activities improve profitability but also increase risk. Using data from the loan portfolios of German banks between 1996 and 2002, Hayden et al. (2007) analyze the effects of portfolio diversification across different sectors and this is found to reduce returns. Lepetit, et al. (2008) look at the relationship between risk and product diversification for European banks between 1996 and 2002, and they also find that banks with higher credit risks tend to expand more into non-interest-based income activities. Berger et al. (2010), using data for Russian banks over the period 1999 to 2006, found that increased loan concentration or reduced diversification is associated with increased profits and reduced risks, but only up to a certain threshold.

Tabak et al. (2011), carried out a panel study of the relationship between Brazilian 96 banks' loan portfolio concentration and risk for the 2003–2009 period, provide evidence that loan concentration impacts banks positively by increasing profitability while reducing default risk, thus focusing on a few sectors is more beneficial than diversifying. Sanya and Wolfe (2011) analyze a sample of banks from 11 emerging countries between 2000 and 2007 and find that diversification improves profitability and stability. Nonetheless, Turkmen and Yigit (2012) examine the effect of sectoral and geographical diversification on the performance of 40 Turkish banks for the period 2007 to 2011 and find that diversification significantly reduces bank performance. Amidu and Simon (2013) examine how the level of competition affects diversification and stability using a sample of 978 banks in 55 emerging and developing countries over an eight-year period from 2000–2007. According to the regression results, diversification, deposit ratio, GDP, and inflation are all negatively associated with bad loans. Also, diversification and inflation were negatively associated with Risk Adjusted Return on Asset (RAROA). They discovered that deposit ratio and GDP were positively related to ROROA.

Meslier et al. (2014) also find that revenue diversification positively affects risk-adjusted performance for a sample of the Philippines's banks. Taking into account financial structures and reforms for a sample of banks in 29 Asia-Pacific countries over the period from 1995 to 2009, Lee et al. (2014a) also find that banks are able to improve their performance when they diversify. Singh (2014) assessed the effects of loan diversification on risk and returns of 19 central cooperative banks in Punjab for the period of 10 years (2002–2011). The simple linear regression result revealed that diversification has adversely affected the yield on assets and it has not helped the banks to reduce risk. Chen et al. (2014) assessed the effect of loan diversification on

commercial banks' return and risk of 16 banks in China for the 2007–2011 period. The OLS regression shows that sectorial diversification is associated with reduced return and risk. Atahau and Cronje (2014) examined the effect of loan portfolio structure on the performance of 30 government-owned banks in Indonesia for the period 2003 to 2011. According to the GLS estimation results, economic sector loan concentration and interest rate were negatively and statistically insignificantly related to loan portfolio return. Both loan type portfolio concentration and NPL were found to be positive and insignificant with regard to the loan portfolio return of banks in Indonesia. But GDP growth indicates a negative and significant impact on loan portfolio return.

Belguith and Bellouma (2017) examined the impact of loan portfolio diversification on 10 Tunisian banks' profitability over the period 2000–2015 and the result of random effect estimation shows that focusing on a few sectors is more profitable than diversifying bank lending operations. However, for foreign banks, loan portfolio diversification is found to be positively associated with higher bank profitability. Adzobu et al. (2017) examine the effect of loan portfolio diversification on bank performance of 30 Ghanaian banks that operated between 2007 and 2014 and find that loan portfolio diversification does not improve banks' profitability nor does it reduce banks' credit risks. Cinar et al. (2018) evaluate the effect of diversification on the performance of 34 Turkish commercial banks for the period 2005–2016. The Feasible Generalized Least Squares regression indicates that diversification upturns profitability and sectorial diversification declines profits but upturns risk. Yang et al. (2019) studied the impact of bank diversification on systemic risk of U.S. commercial banks from 2000 to 2013, and OLS results indicate that asset diversification has a positive and insignificant effect on systemic risk. Funding diversification was reported to be negative and insignificant with systemic risk, but revenue diversification was reported to be negative and significant with systemic risk. The loan loss provision ratio, equity to assets ratio, and liquidity ratio were all associated with systemic risk in a negative and significant way. However, loans to assets were found to be positive and significant with systemic risk. Sissy et al. (2017) use a sample of 320 banks across 29 African countries and find that banks boost performance if they diversify cross-border. Shim (2019) examined the association between credit diversification and market structure on bank stability of sampled U.S. commercial banks over the period 2002: Q1-2013: Q3. The OLS regression reveals that diversification, size, deposit ratio, and GDP have positive and significant effects on ROA as well as a negative impact on ROROA.

In Nigeria, Ugwuanyi et al. (2012) studied how corporate diversification affects profitability in the financial service sectors in Nigeria for the period 1998–2007. Using OLS estimation, it was found that geographical diversification has a positive and significant impact on ROA in the Nigerian financial services sector, while operational diversification exerts a negative and significant impact on ROA of banks in Nigeria. Oluitan and Balogun (2018) examined the association between revenue diversification and financial stability of banks in Nigeria for the period 1960 to 2015 and conducted a time series analysis using an error correction model and observed a positive impact of income diversification on financial stability. Adaramola and Ogunsakin (2020) examined the impact of portfolio management on bank performance in Nigeria for five banks. Data on loan portfolio management was obtained through a questionnaire, whereas the performance of bank proxied in terms of return on assets was obtained primarily through the

annual reports of the selected banks. The logit regression analysis reveals that loan risk analysis, loan risk diversification, and loan risk monitoring positively and significantly affect bank performance in Nigeria.

Ihejirika and Aderigha (2021), examined the association between portfolio diversification and the performance of deposit money banks in Nigeria Analysing the Nigerian Banking Industry from 1990-2019. The study measured treasury bills, ordinary shares, investments in subsidiaries, and foreign investments outside Nigeria as proxies for portfolio diversification, while Return on Equity was a proxy for performance. The ARDL and Bounds tests were used to estimate the short- and long-run relationships respectively. The study discovered that in the short run, treasury bills and ordinary shares were negatively related but not significantly related to return on equity, while investments in subsidiaries and foreign balances outside Nigeria were positively related to the return on equity of DMBs at most lag periods. However, it was further observed that at different lag periods, the variables do not significantly predict the direction of return on equity of DMBs. Long-run relationships were also observed to exist amid treasury bills, acquisition of ordinary shares, investment in subsidiaries, and foreign investments outside Nigeria.

Rhema, Okoye and Ambrose (2021), assessed the impact of revenue diversification on the performance of eight banks in Nigeria for the period 2008–2018. Income diversification was indexed by foreign exchange income, commission income, and firm age, while Tobin's Q ratio was used to proxy performance. The result of EGLS indicates that commission income exerts a positive and significant influence on Tobin's Q ratio of banks, while foreign exchange transaction income and firm age exert a significant negative influence on Tobin's Q ratio of deposit money banks in Nigeria. From an emerging market perspective, Oluwaseyi et al. (2021) study the effect of revenue diversification on the firm value and stability of banks in Nigeria and Malaysia. The study uses financial data from 26 Malaysian and Nigerian banks for the period 2009–2017, and the results of the GMM estimation show that revenue diversification significantly affects the firm value and stability of Nigerian banks. Liquidity, administrative expenses, net interest margin (NIM), non-performing loans (NPL), size, GDP growth rate, and inflation also affect the firm value and stability of a bank. For Malaysian banks, diversification variables do not significantly affect the firm value of a bank, while liquidity, administrative expenses, NIM, and size significantly affect firm value. Diversification, liquidity, administrative expenses, NIM, NPL, size, GDP growth, and inflation rate have a significant impact on the stability of Malaysian banks.

3.0 RESEARCH METHODOLOGY

A non-survey research design was used to cover all the 22 listed commercial banks in Nigeria as at December 31st, 2020 for the period of 12 years (2009–2020). Access Bank Plc, Eco Bank Nigeria Plc, First City Monument Bank Plc, First Bank Plc, Fidelity Bank Plc, Guaranty Trust Bank Plc, Stanbic IBTC Bank Plc, Sterling Bank Plc, and Union Bank Plc. Others include, United Bank for Africa Plc, Unity Bank, Keystone Bank Ltd, Standard Chartered Bank Ltd, Citi Bank Ltd, Sterling Bank Plc, Wema Bank, Zenith Bank Plc. Thus, the dependent variables of this study are risk (NPL) and return (ROA and RAROA), while loan diversification is the independent variable of the study after controlling for bank-specific variables (bank size, equity ratio, and deposit ratio) and macro-economic variables (GDP and Inflation). The dataset containing

dependent variables, independent variables, and bank-specific factors was derived from annual reports and accounts of publicly traded commercial banks, whereas the dataset containing macroeconomic variables was obtained from the CBN Statistics. After a preliminary test of descriptive statistics and correlation of the study's variables, Pooled Ordinary Least Square (POLS) and Generalised Least Square (GLS) regression were used to test the null hypotheses that Loan Portfolio Diversification has no significant effect on Risks and Returns of Banks in Nigeria.

3.1 Loan Diversification Measures

As a proxy of loan diversification, this study used the classical concentration measure known as the Hirshmann–Herfindahl Index (HHI) as used by Singh (2014) and Belguith and Bellouma (2017). The advantage of this indicator is that it takes into account the bank’s exposure to a high number of borrowers, which makes it sensitive to changes in the share of the involvement of both large and small entities. HHI is a measure commonly used in empirical market research and represents the sum of the squares of exposures as a fraction of total exposure under a given classification. It is equal to the sum of the squares of the shares of credit exposures to each borrower (sector) in the entire loan portfolio. It is a measure of market concentration and supposes ideal diversification as equal exposure to every sector (Raei et al. 2016 and Chen et al. 2013). The higher the HHI value is (1), the less the diversification of the bank. The inferior limit of the HHI is 1/n and represents a perfectly diversified portfolio which signifies an equal share of exposure to each economic sector. If the HHI is equal to 1, the bank grants credit to only one economic sector. This means perfect specialization.

We define relative exposure of each sector *i* at time *t* as its nominal *exposure_{it}* divided by the total exposure (*exposure_{kt}*), then we calculate the concentration measure, for each bank,

$$relative\ exposure_k = \frac{exposure_{kt}}{\sum_{k=1}^n exposure_{it}}$$

The HHI of *bank_i* at *time_t* is defined as following:

$$HHI_{it} = \sum_{k=1}^n \left(\frac{exposure_{kt}}{\sum_{k=1}^n exposure_{kt}} \right)^2$$

HHI_{it}: Credit based Herfindahl index for *bank_i* in *year_t*; *Exposure_{kt}*: Credit provided for a special sector *k* by bank *i* at year *t*; $\Sigma Exposure_{it}$: Total credit provided by bank *i* at year *t*; and *n*= Total number of economic sectors to which the banks have provided credits.

3.2 Model Specification

Based on the work of Belguith and Bellouma (2017), the following models were adapted after modification to include NPL and deposit ratio

$$NPL_{i,t} = \beta_0 + \beta_1 HHI_{i,t} + \beta_2 BAS_{i,t} + \beta_3 EQR_{i,t} + \beta_4 DTA_{i,t} + \beta_5 GDP_{i,t} + \beta_6 INF_{i,t} + \mu_{i,t} \text{-----}(1)$$

$$ROA_{i,t} = \beta_0 + \beta_1 HHI_{i,t} + \beta_2 BAS_{i,t} + \beta_3 EQR_{i,t} + \beta_4 DTA_{i,t} + \beta_5 GDP_{i,t} + \beta_6 INF_{i,t} + \mu_{i,t} \text{-----}(2)$$

$$RAROA_{i,t} = \beta_0 + \beta_1 HHI_{i,t} + \beta_2 BAS_{i,t} + \beta_3 EQR_{i,t} + \beta_4 DTA_{i,t} + \beta_5 GDP_{i,t} + \beta_6 INF_{i,t} + \mu_{i,t} \text{-----}(3)$$

Where:

- NPL_{i,t} Non performing loan of banks i at year t
- ROA_{i,t} Return on Assets of bank i at year t
- RAROA_{i,t} Risk-adjusted return on assets of bank i at year t
- HHI_{i,t} Hirschman-Herfindahl Index for bank i at years $t_{SEP}^{[]}$
- BAS_{i,t} Bank size of bank i at year t
- EQR_{i,t} Equity ratio of bank i at year t
- DTA_{i,t} Deposit ratio of bank i at year t
- GDP_{i,t} Gross domestic product of bank i at year t
- INF_{i,t} Inflation rate of bank i at year t
- $\beta_{0\ i,t}$ Regression intercept of bank i at year t
- $\beta_{1\ i,t}, \dots, \beta_{5\ i,t}$ Regression coefficients of the study variables of bank i at year t
- μ_{it} Error term of bank i at time t

TABLE 1: VARIABLE DEFINITIONS

Variable		Definition
Dependent Variables	Risk (NPL)	Non-performing loan to total loans as used by Tabak et al, (2011); Chen et al (2014), Singh (2014), and Raei et al, (2016)
	ROA	Profit after tax to total assets as used by Turkmen and Yigit (2012), Chen et al (2014), Raei et al, (2016), Belguith and Bellouma (2017)
	Risk-adjusted ROA (RAROA)	ROA divided by its standard deviation as used by Belguith and Bellouma (2017)
Independent Variable	Loan Diversification (HHI)	Hirschman-Herfindahl Index as used by Turkmen and Yigit (2012), Chen et al (2014), Singh (2014), and Belguith and Bellouma (2017)
Control Variables	Bank Size	Log of total assets as used by Turkmen and Yigit (2012), Chen et al (2014) and Raei et al, (2016)
	Equity ratio	Equity to total assets as used by Tabak et al, (2011), Chen et al (2014), and Belguith and Bellouma (2017)
	Deposit ratio	Deposit to total assets as used by Wagner (2007)
	GDP	Annual GDP growth rate as used by Belguith and Bellouma (2017)
	Inflation	Annual inflation rate as used by Belguith and Bellouma (2017)

Source: Authors' Compilation

4.0 RESULTS AND DISCUSSIONS

This section presents and interprets the results obtained from the regression estimation of the study's models. It starts with a preliminary test of the variables using summary statistics and a correlation matrix with the view to describing the variables and their associations among one another. The models for the study were estimated using POLS regression and GLS regression. Thus, fixed effect regression was used in predicting model 1, POLS predicts model 2, while Random effect regression predicts model 3 of the study. In order to ensure reliability and validity of the estimations, post-estimation tests such as Multicollinearity test, Heteroscedasticity test, Normality test, Hausman specification test and Lagrangian Multiplier test for random effects were carried out.

TABLE 2: SUMMARY STATISTICS

Variables	N	Mean	Std. Dev	Min	Max
NPL	156	0.108	0.158	0.00928	0.980
ROA	156	0.0137	0.0247	-0.105	0.140
RAROA	156	0.998	2.260	-3.241	12.56
HHI	156	0.197	0.109	0.100	0.912
BAS	156	9.121	0.416	8.045	9.993
EQR	156	0.0987	0.203	-1.547	0.281
DTA	156	0.682	0.108	0.145	0.981
GDP	156	0.0411	0.0369	-0.0180	0.0938
INF	156	0.120	0.0254	0.0806	0.165

Source: Authors' Computation

Table 2, presents statistics of the study's variables along with their mean, standard deviation, minimum, and maximum values. From Table 2, the NPL has an average ratio of 0.108 with a standard deviation of 0.158, close to the mean. The NPL ranged between 0.00928 and 0.980 among the sampled banks. Thus, banks in Nigeria had an average NPL of 10.8% within the study period. The ROA of banks has a mean ratio of 0.0137 with a standard deviation of 0.0247, close to the mean. The ROA ranges between -0.105 and 0.140. Thus, the average ROA of all the sampled banks within the period of the study is 1.37%, with some banks having a loss of 10.5% and some with the highest return of 14% in the industry. For RAROA, the average ratio is 0.998 with a standard deviation of 2.260, dispersed from the mean. The minimum value of ROROA is -3.241 and the maximum value is 12.56.

The mean ratio of HHI is 0.197, with a range between 0.100 and 0.912. This means that, on average, banks diversified their loans and advances to various sectors with only a 19.7% average concentration ratio. Some banks have not diversified their loan portfolios, as evidenced by the 91.20% concentration ratio. BAS has an average value of 9.121 with a minimum value of 8.045 and a maximum value of 9.993 among banks. EQR has an average ratio of 0.0987 with a minimum ratio of -1.547 and a maximum ratio of 0.281. Thus, on average, the equity shareholders of banks acquired 9.87% of the industry's total assets. DTA has a mean ratio of 0.682 with a minimum ratio of 0.145 and a maximum ratio of 0.981 among banks. Thus, on average, the deposit to total

assets' ratio of banks constitutes 68.20% of the industry total assets with some banks reported 98.1%. GDP grew with an average ratio of 0.0411 within the period of the study, with a minimum growth of -0.0180 and a maximum growth of 0.0938. And lastly, inflation rate raised at an average ratio of 0.120 with a minimum rate of 0.0806 and a maximum rate of 0.165 within the period of the study.

TABLE 3: CORRELATION MATRIX

	NPL	ROA	RAROA	HHI	BAS	EQR	DTA	GDP	INF	VIF
NPL	1									-
ROA	-0.270***	1								-
RAROA	-0.186*	0.500***	1							-
HHI	0.354***	-0.0124	-0.0829	1						1.38
BAS	-0.399***	0.330***	0.365***	-0.261***	1					1.63
EQR	-0.488***	0.417***	0.199*	-0.492***	0.303***	1				1.55
DTA	0.0159	-0.103	-0.120	-0.0388	0.0857	0.228**	1			1.11
GDP	0.129	-0.0357	-0.0657	-0.0909	-0.440***	0.150	0.166*	1		1.81
INF	0.0997	-0.0166	-0.00687	0.118	0.0304	-0.0689	-0.181*	-0.430***	1	1.31

Source: Authors' Computation. Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ denotes 5%, 1% and 0.1% significance level

Table 3 presents the correlation matrix between the dependent variables (NPL, ROA and RAROA) and explanatory variables (HHI, BAS EQR DTA GDP and INF). It also shows the relationships between all pairs of variables in the regression model; the relationships between all explanatory variables individually with the explained variable; and the relationships between all the explanatory variables themselves. It shows the correlation coefficients along with the significance level of the relationship between the variables. The values of the correlation coefficient range from -1 to 1. The sign of the correlation coefficient indicates the direction of the relationship (positive or negative). The absolute value of the correlation coefficient indicates the strength, with larger values indicating stronger relationships. The correlation coefficients on the main diagonal are 1.0 because each variable has a perfect positive linear relationship with itself.

As shown in table 3, the relationship between HHI and NPL is low, positive, and significant at 0.1%, with a correlation coefficient value of 0.354. Also, the relationship between BAS and EQR with NPL is low, negative, and significant at 0.1% with a correlation coefficient value of -0.399 and -0.488, respectively. Low, positive and insignificant linear relationships exist between DTA, GDP, and INF with NPL with correlation coefficient values of 0.0159, 0.129, and 0.0997, respectively. The correlation of BAS and EQR with ROA are low, positive, and significant at 0.1% with correlation coefficient value of 0.330 and 0.417 respectively. Low, negative and insignificant linear relationship exist between HHI, DTA, GDP, and INF with ROA with correlation coefficient values of -0.0124, -0.103, -0.0357 and -0.0166 respectively. The relationship between BAS and EQR with RAROA are low, positive, and significant at 0.1% and 5% respectively with correlation coefficient value of 0.365 and 0.199. Low, negative and

insignificant linear relationship exist between HHI, DTA, GDP, and INF with RAROA with correlation coefficient value of -0.0829, -0.120, -0.0657 and -0.00687 respectively.

Similarly, the relationship between HHI and all the other explanatory variables is low and negative, except for INF, which is positive. BAS was weak and positively correlated with all the other explanatory variables, except for GDP, which is negative. Also, EQR was weak and positively correlated with all the other explanatory variables, except for INF, which was negative. DTA has a weak and positive relationship with GDP, and it also has a weak and negative linear relationship with INF. And finally, the correlation between GDP and INF is weak and negative.

To determine the presence of a collinearity problem, a Variance Inflation Factor (VIF) test is carried out, the results of which provide evidence of the absence of collinearity. This is because the results of the VIF test range from a minimum of 1.11 to a maximum of 1.81. VIF of less than 10 can still be proof of the absence of collinearity, and a VIF of more than 10 should be considered an indication of harmful multicollinearity (Gujarati 2003).

TABLE 4: REGRESSION RESULTS

Variables	NPL	ROA	RAROA
	Fixed Effect	Pooled OLS	Random Effect
HHI	0.128 (0.102)	0.101*** (0.0138)	2.364** (1.033)
BAS	-0.171** (0.0720)	0.0144*** (0.00308)	1.703*** (0.617)
EQR	-0.238*** (0.0693)	0.0665*** (0.00664)	1.741*** (0.616)
DTA	0.232* (0.108)	-0.0406*** (0.00996)	-2.919*** (1.105)
GDP	0.0313 (0.722)	0.0378 (0.0369)	4.751 (4.682)
INF	0.707 (0.707)	-0.0961** (0.0451)	-0.964 (4.354)
Constant	1.421* (0.745)	-0.105*** (0.0309)	-13.26** (5.995)
Heteroskedasticity	0.0000	0.8972	0.0000
Normality	0.0000	0.0000	0.0000
Hausman	0.0000	0.9264	0.9998
Group wise heteroskedasticity	0.0000	-	-
Lagr. Multiplier	-	0.0614	0.0000
Observations	156	155	156
R-squared	0.247	0.520	0.141
Sig.	26.75***	26.76***	25.09***
Number of bank	13	13	13

BANK FE	YES	
YEAR FE	YES	
BANK RE		YES
YEAR RE		YES

Source: Authors' Computation: Notes: * p<0.01, ** p<0.05, * p<0.1 denotes 1%, 5% and 10% significance levels. The standard errors in parenthesis while the other figures represent the coefficient.**

Table 4 presents the coefficients and standard errors of the fixed-effect regression result on the effect of loan diversification on non-performing loans (NPL) in model 1. It also presents the results of pooled OLS robust regression on the effect of loan diversification on return on assets (ROA) in model 2 as well as the results of random effect estimation on the effect of loan diversification on risk adjusted return on assets (RAROA) in model 3.

Model 1 in Table 4 presents the FE Regression result of the dependent variable (NPL) and the explanatory variables of the study (HHI, BAS, EQR, DTA, GDP and INF). The result is presented after testing for the Hausman specification. The result of the Hausman test reveals that the fixed effect (FE) model is more efficient than the random effect (RE) model, as evident by the p-value of 0.0000, and hence, the fixed effect result is adopted for model 1. To further validate the FE estimation and to check for constant variance of error term in FE, Modified Wald test for group wise heteroskedasticity was carried out, and the result reveals that heteroskedasticity exists with a p-value of 0.0000 and hence FE with robust standard errors was conducted to control the group wise heteroskedasticity as presented in Table 4. The results of FE regression reveal an R-squared of 0.247, which signifies that 25% of the total variation in NPL of listed commercial banks in Nigeria is caused by their HHI, BAS, EQR, DTA, GDP, and INF while the remaining 75% of the total variation in the NPL was caused by factors not explained by the model. This indicates that the model is fit and the variables are properly selected, combined and used as a substantial value of the NPL is accounted for by the variables. This can be confirmed by the value of F-statistics of 26.75 at 1% level of significance.

Similarly, model 2 in Table 4 presents the pooled OLS robust regression result of the dependent variable (ROA) and the explanatory variables of the study (HHI, BAS, EQR, DTA, GDP, and INF). The result is presented after testing for Hausman specification and a Lagrangian multiplier test for random effects. The result of the Hausman test reveals that the random effect (RE) model is more efficient than the fixed effect (FE) model, as evident by the p-value of 0.9264, and hence, the fixed effect is rejected in favour of the random effect model. However, to select between RE and Pooled OLS regression, a Lagrangian multiplier test for random effects was carried out, and the result reveals that Pooled OLS is more efficient than RE as shown by the p-value of 0.0614. And hence, the result of pooled OLS robust regression is adopted for model 2. The results of pooled OLS robust regression reveal a cumulative R-squared of 0.520, which denotes that 52% of the total variation in ROA of listed commercial banks in Nigeria is caused by their HHI, BAS, EQR, DTA, GDP, and INF, while the remaining 48% of the total variation in ROA was caused by factors not explained by the model. The F-statistics of 26.76 at 1% significance level show that the model is fit and statistically significant. Hence, variables are properly selected and used

in the model.

Finally, Model 3 in Table 4 presents the RE regression result of the dependent variable (RAROA) and the explanatory variables of the study (HHI, BAS, EQR, DTA, GDP, and INF). The result is presented after testing for Hausman specification and a Lagrangian multiplier test for random effects. In order to examine whether endogeneity exists, which could potentially lead to a biased coefficient, a Hausman specification test to choice between Fixed Effect (FE) and Random Effect (RE) regression is performed. The result of the Hausman test reveals that the random effect (RE) model is more efficient than the fixed effect (FE) model, as evident by the p-value of 0.9998, and hence, the fixed effect is rejected in favour of the random effect model. However, to select between RE and Pooled OLS regression, Lagrangian multiplier test for random effects was carried out, and the result reveals that RE is more efficient than Pooled OLS, as shown by the p-value of 0.0000. And hence, the result of RE was adopted for model 3. The RE regression results of model 3 reveal an R-squared of 0.141, denoting that 14% of the total variation in RAROA of listed commercial banks in Nigeria is caused by their HHI, BAS, EQR, DTA, GDP, and INF, while the remaining 86% of the changes in the RAROA were caused by factors not explained by the model. The wald chi2 of 25.09 at 1% significance level indicates that the model is fit and statistically significant in predicting the effect of all the explanatory variables on RAROA of listed commercial banks in Nigeria.

The FE regression result reveals that HHI is positively and statistically insignificant with respect to the NPL of listed commercial banks in Nigeria. This means that a percentage increase in HHI does not significantly increase the NPL of banks in Nigeria, on average, *ceteris paribus*. This result is supported by the work of Acharya and Hasan (2001), Hayden et al. (2007), Lepetit et al. (2008), Berger et al. (2010), Tabak et al. (2011) and Cinar et al. (2018). The result is also in support of corporate finance theory. But, it contradicts the findings of Stiroh and Rumble (2006), Bebczuk and Galindo (2008), Agbloyor and Aboagye (2017); Linar, Gursel and Tuzcu (2018); and Yang et al. (2019). It also contradicts traditional banking theory, which argues that spreading lending activities across several geographical regions and industries allows banks to diversify their risk. And that diversification has a tendency to reduce risk and improve banks' performance by accentuating the reduction in risk as the total loan portfolio is spread across borrowers in different industries.

BAS was found to have a significant negative impact on the NPL of banks. This means that a percentage increase in BAS caused a 0.171 decrease in NPL at a 5% significance level on average, all things being equal. This result ties in with the findings of Agbloyor and Aboagye (2017) and Yang et al. (2009). But it contradicts the findings of Chen et al. (2014), Linar, Gursel and Tuzcu (2018), and Shim (2019). The association between EQR and NPL is negative and statistically significant. This means that a percentage increase in EQR is associated with a 0.238 decrease in NPL at a 1% significance level on average, holding other factors constant. This finding ties in with the work of Chen et al. (2014) and Yan et al. (2019). However, it contradicts the findings of Agbloyor and Aboagye (2017). DTA has a positive and significant impact on the NPL of banks. Thus, a percentage change in DTA is associated with a 0.232 increase in NPL at a 10% level of

significance on average, all things being equal. This result is supported by the findings of Shim (2019). But it contradicts the findings of Amidu and Simon (2013). The GDP was found to have a positive and insignificant association with the NPL of listed commercial banks in Nigeria. This means that a percentage increase in GDP does not significantly increase the NPL of banks in Nigeria, on average, *ceteris paribus*. This result is in line with the findings of Agbloyor and Aboagye (2017). But it does not tally with the work of Amidu and Simon (2013). And lastly, INF is positively and statistically insignificant compared to the NPL of banks. Thus, a percentage increase in INF does not significantly increase the NPL of banks in Nigeria, on average, *ceteris paribus*. This result does not support the findings of Amidu and Simon (2013).

The pooled OLS robust regression in model 2 shows that HHI has a positive and significant impact on the ROA of banks. Thus, a percentage increase in HHI is associated with a 0.101 increase in ROA at a 1% level of significance on average, all things being equal. This finding ties in with the findings of Stiroh and Rumble (2006), Bebczuk and Galindo (2008), Sanya and Wolfe (2011), Cotugno and Stefanelli (2012), Lee et al., (2014a), Sissy et al., (2017), and Cinar et al. (2018). It is also supported by traditional banking theory arguments, which suggest that banks should be as diversified as possible, and that diversification across sectors reduces their chance of costly financial distress/bankruptcy. But, the result contradicts the findings of Hayden et al. (2007), Berger et al. (2010), Fang et al. (2011), Turkmen and Yigit (2012), and Singh (2014). It also contradicts the argument of corporate finance theory that suggests that a firm should concentrate its activities to utilize its competence and expertise and that diversification of the credit portfolio is negatively associated with the profitability of banks.

BAS has a positive and significant impact on the ROA of banks. Thus, a percentage increase in the size of assets of banks is associated with a 0.0144 increase in ROA at a 1% level of significance on average, all things being equal. This finding is consistent with the findings of Chen et al. (2014), Linar et al. (2018), and Shim (2019). But, it does not tally with the findings of Yang et al. (2009) and Agbloyor and Aboagye (2017). EQR was found to have a positive and significant impact on the ROA of listed commercial banks in Nigeria at a 1% level of significance. This means that a unit increase in EQR, caused a 0.0665 increase in the ROA of banks at a 1% level of significance on average, holding other factors constant. This finding ties in with the findings of Chen et al. (2014), Belguith and Bellouma (2017) and Linar et al. (2018). But, this does not tally with the work of Yan et al. (2009) and Agbloyor and Aboagye (2017).

DTA has a significant negative impact on the ROA of listed commercial banks in Nigeria. Thus, an increase in DTA caused a 0.0406 decrease in the ROA of banks at a 1% level of significance on average. This result is inconsistent with the results of Shim (2019). GDP was positively and insignificantly associated with the ROA of listed commercial banks in Nigeria. Thus, an increase in GDP is associated with a 0.0378 insignificant increase in the ROA of banks on average. This finding ties in with the work of Belguith and Bellouma (2017). However, it contradicts Shim's (2019) finding. Lastly, INF has a significant negative impact on the ROA of listed commercial banks in Nigeria. Thus, a percentage increase in INF is associated with a 0.0961 decrease in ROA at a 5% level of significance on average, all things being equal. This finding ties in with the work of Adamu and Simon (2013). This, however, runs counter to the findings of Belguith and

Bellouma (2017).

The RE regression estimation shows that HHI has a positive and significant impact on the RAROA of listed commercial banks in Nigeria. Thus, a unit increase in HHI is associated with a 2.364 increase in RAROA of banks at a 5% level of significance on average. All things being equal, this finding is consistent with the results of Chiorazzo et al. (2008), Meslier et al. (2014), and Belguith and Bellouma (2017). It is also supported by traditional banking theory but contradicts the results of Adamu and Simon (2013) and Shim (2019). It also contradicts the argument for corporate finance.

BAS has a positive and significant impact on RAROA for banks. Thus, a percentage increase in the size of assets of banks is associated with a 1.703 increase in RAROA at a 1% level of significance on average, all things being equal. This finding ties in with the work of Belguith and Bellouma (2017). But, it does not tally with the findings of Adamu and Simon (2013) and Shim (2019). EQR found to have a positive and significant impact on RAROA of banks at a 1% level of significance. Thus, a unit increase in EQR caused 1.741 increases in RAROA of banks at a 1% level of significance on average, holding other factors constant. These findings tally with the findings of Belguith and Bellouma (2017). But, this does not tally with the work of Shim (2019). DTA has a negative and significant impact on the RAROA of banks. Thus, an increase in DTA caused a 2.919 decrease in the RAROA of banks at a 1% level of significance on average. This result is consistent with the results of Shim (2019). But, it is not consistent with the work of Adamu and Simon (2013). GDP was positively and insignificantly associated with the RAROA of banks. Thus, an increase in GDP is associated with a 4.751 insignificant increase in RAROA of banks on average. This finding ties in with the work of Belguith and Bellouma (2017). However, it contradicts Shim's (2019) finding. Lastly, INF has a negative and insignificant impact on the RAROA of banks. Thus, a percentage increase in INF is insignificantly associated with a 0.964 decrease in RAROA, on average, all things being equal. This finding ties in with the work of Belguith and Bellouma (2017). However, this contradicts Adamu and Simon's (2013) finding.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The existing banking literature does not provide consensus as to the question of whether banks should diversify portfolios and geographic regions, or should they specialize? Instead, there is evidence to support both arguments. Traditional theory proposes that banks should be as diversified as possible to reduce their chance of costly financial distress/bankruptcy. Several models of intermediation suggest that diversification makes it cheaper for institutions to achieve credibility in their role as screeners or monitors of borrowers (Diamond, 1984; Sanya and Wolfe 2011, for example). Contrary studies (Jensen, 1986; and Chen et al., 2013) provide evidence that financial institutions should focus on a single line of business so as to take greatest advantage of management's expertise and reduce agency problems, leaving investors to diversify on their own. Overall, the main issue is whether banks should diversify or focus, and the impact on the returns of the bank still remains an on-going debate in the diversification/focus literature.

Recent literature questions the beneficial impacts of loan concentration for banks and argues that loan portfolio concentration increases return and also reduces default risk for banks due to

increased monitoring efficiency and expertise of banks in the sectors they lend (Berger et al., 2010; Chen et al., 2013; Raei et al., 2016). Other studies contend that diversification benefits include risk reduction and performance improvement, while agency issues are common associated disadvantages (Stiroh and Rumble, 2006; Bebczuk and Galindo, 2008). Interconnected studies on the impact of loan portfolio diversification on bank returns and risk reveal disparate results, justifying a reexamination of the relationship between loan diversification and bank risk-return. Hence, this study examines the impact of loan diversification on the risks and returns of 13 listed banks in Nigeria over the period 2009–2020. Due to the panel nature of the study, pooled OLS, FE and RE regression were used to estimate the study's models. While scholars such as Denis et al. (1997) and Mishkin et al. (2013) within corporate finance theory claim that the optimal portfolio strategy for enhancing returns and countering agency problems is to concentrate on operations in which banks possess expertise, this study finds no empirical evidence for this assertion in the Nigerian banking sector. In fact, the study results support the views held by Diamond (1984) and others within traditional banking theory who base their arguments on improved monitoring incentives and hence improved returns as banks become more diversified. Thus, the study concludes that diversification of the loan portfolio improves the returns of banks in Nigeria and that diversifying bank lending does not significantly increase the risks of banks in Nigeria. The findings of the study have implications for the Nigerian financial system regulators, as it opines that policymakers need to strengthen measures aimed at controlling risk to ensure financial stability, rather than higher banking industry's profits. The study recommends that banks in Nigeria should diversify their loan portfolios to increase returns and that when preparing regulatory frameworks encouraging banks to either specialize or diversify their credit portfolios, policymakers should assess the underlying risk. And that banks should strengthen their risk management policies to ensure effective and efficient monitoring of their loan portfolios to improve credit quality.

REFERENCES

- Aarflot, S., and Arnegard, L., (2017). The effect of industrial diversification on banks' performance: A case study of the Norwegian banking market. SNF Working Paper No 09/17.
- Atahau, A. D. R. and Cronje, T. (2014). Loan Portfolio Structure and Performance of Government-owned Banks in Indonesia: does size matter? *Corporate Ownership & Control* / Volume 11, Issue 4.
- Acharya, V. V., and Hasan, I., (2001). The Effects of Focus and Diversification on Bank Risk and Return: Evidence from Individual Bank Loan Portfolios. Anthony Saunders, Stern School of Business – NYU
- Acharya, V., Hasan, I., and Saunders, A., (2006). Should Banks be diversified? Evidence from Individual Bank Loan Portfolios. *Journal of Business*, 79(3), 1355-1413.
- Adzobu, L.D., Agbloyor, E.K., and Aboagye, A. (2017). The effect of loan portfolio diversification on banks' risks and return: Evidence from an emerging market. *Managerial Finance*. Emerald Publishing Limited. [SEP]
- Adaramola, A. B., and Ogunsakin, Y. O. (2020). Portfolio Management and Bank Performance in Nigeria. *International Journal of Empirical Finance and Management Sciences*. Vol. 02, No. 04, 2706-803X.

- Amidu, M., and Simon, W., (2013). Does bank competition and diversification lead to greater stability? Evidence from emerging markets. *Review of Development Finance* 3 (2013) 152–166.
- Avila, F., Flores, E., Lopez-Gallo, F., and Marquez, J. (2012). Concentration Indicators: Assessing the Gap between Aggregate and Detailed Data. Proceedings of the Sixth IFC Conference on Statistical issues and activities in a changing environment, Bank for International Settlements, Basel, 28-29 August 2012, Vol. 36, pp. 542-559.
- Basel Committee on Banking Supervision (2006). Studies on Credit Risk Concentration. BIS Working Paper No. 15. [SEP]
- Basel committee on banking supervision. (2014). Supervisory Framework for measuring and controlling large exposures. Available at: <http://www.bis.org/publ/bcbs283>.
- Basel. (1991). Measuring and controlling large credit exposures. Reported by Basel Committee on Banking Supervision. 8 p
- Bebczuk, R. and Galindo, A. (2008). Financial crisis and sectoral diversification of Argentine banks. *Applied Financial Economics*, Vol.18, pp. 199-211. [SEP]
- Beck, T., and Jonge, D. O. (2013). Lending Concentration, Bank Performance and systemic Risk: exploring cross-country variation. Policy Research Working Paper [6604] World Bank. September.
- Belguith, H., and Bellouma, M. (2017). The Impact of Loan Portfolio Diversification on Tunisian Bank's Profitability. *International Journal of Emerging Research in Management & Technology* ISSN: 2278-9359 (Volume-6, Issue-6).
- Berger, A., Hasan, I., and Zhou, M., (2010). The effects of focus versus diversification on bank performance: Evidence from Chinese banks. *Journal of Banking and Finance* 34, pp.1417–1435. [SEP]
- Bove, R., and Pngsten, A. (2008). Why do specialized banks succeed? An empirical investigation of the credit business of cooperative and savings banks. 28 p. <http://dx.doi.org/10.2139/ssrn.1098421>
- Cinar, Y., Gursel, G. G., and Tuzcu, S. E. (2018). The impacts of diversification strategies of Turkish banks on their profitability and risk: a panel data analysis. Ankara Üniversitesi SBF Dergisi, Cilt 73, No. 4, 2018, s. 1141 - 1168
- Chen, Y., Shi, Y., Wei, X. and 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.
- Chen, Y., Wei, X., Zhang, L., and Shi, Y. (2013a). Sectoral Diversification and the banks' return and risk: Evidence from Chinese Listed Commercial Banks. *Procedia Computer Science*, Vol. 18, pp. 1737-1746.
- Chiorazzo, V., Milani, C. and Salvini, F. (2008). Income diversification and bank performance: Evidence from Italian banks. *Journal of Financial Services Research*, 33, 181-203.
- Cotugno, M. and Stefanelli, V. (2012). Geographical and product diversification during instability financial period: Good or bad for banks? *International Research Journal of Finance and Economics*, 85, 87-100.
- Denis, D. J., Denis, D. K., and Sarin, A. (1997). Agency Problems, Equity Ownership, and

- Corporate Diversification. *The Journal of Finance*, 52 (1), pp. 135-160.
- Deutsche Bundesbank (2006). Concentration Risk in Credit Portfolios. Deutsche Bundesbank Monthly Report, Issue June 2006.
- Diamond, D. (1984). Financial Intermediation and Delegated Monitoring. *Review of Economic Studies*, 59; 393-414.
- Fang, Y., Hasan, I. and Marton, K. (2011). Institutional development and its impact on the performance effect of bank diversification: Evidence from transition economies. *Emerging Markets Finance & Trade*, 47(4), 5- 22.
- Goetz, M. (2008). Quantitative Analysis Unit. Bank Diversification, Market Structure and Bank Risk Taking: Theory and Evidence from U.S. Commercial Banks. Boston: Working Paper No. QAU12-2, Federal Reserve Bank of Boston.
- Gujarati, D. (2003). *“Basic Econometrics”*. London: McGraw-Hill.
- Gurbuz, A. O., Serhat, Y., and Yusuf, A., (2013). Income Diversification and Bank Performance: Evidence from Turkish Banking Sector. *Journal of BRSA Banking and Financial Markets*, 7 (1): 9-29.
- Hayden, E., Porath, D., and Von W. N. (2007). Does diversification improve the performance of German banks? Evidence from individual bank loan portfolios. *Journal of Financial Services Research* 32, [SEP]123–140. [SEP]
- Hellwig, M., (1998). Allowing for Risk Choices in Diamond’s Financial Intermediation as Delegated Monitoring. Working Paper 98-04, University at Mannheim. [SEP]
- Ihejirika, O.P. and Aderigha, G.A., (2021). Portfolio Diversification and performance Deposit Money Banks: Analysing the Nigeria Banking Industry. *Asian Journal of Economics, Business and Accounting*, 21(15), pp.12-27.
- Jensen, M., (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*. Vol. 76, pp.323–329. [SEP]
- Kamp, A., Pfungsten, A., Mammel, C., and Behr, A. (2007). Diversification and the banks ‘return characteristics: Evidence from loan portfolios of German banks. EFA Zurich Meetings Paper. [SEP]
- Kozak, S. (2015). Concentration of credit exposure as [SEP] a significant source of risk in banking activities: the idea and methods of estimation. *Financial Internet Quarterly, e-finance*, vol.11/nr3, s. 103-115.
- Lee, B. S., and Ming-Yuan L. L., (2012). Diversification and Risk-Adjusted Performance: A Quantile Regression Approach. *Journal of Banking & Finance*, 36 (7): 2157-2173.
- Lee, C., Hsieh, M., Yang, S. (2014a). The relationship between revenue diversification and bank performance: do financial structures and financial reforms matter? *Jpn. World Economy* 29 (1), 18–35. [SEP]
- Lepetit, L., Nys, E., Rous, P., Tarazi, A. 2008. Bank income structure and risk: an empirical analysis of European banks. *J. Bank. Finance* 32 (8), 1452–1467.
- Mercieca, S., Schaeck, K., and Wolfe, S. (2007). Small European banks: benefits from diversification? *Journal of Banking and Finance* 31(7): 1975–1998.
<http://dx.doi.org/10.1016/j.jbank n.2007.01.004>
- Meyer, A., and Yeager, T., (2001). Are small rural banks vulnerable to local economic downturns? Review, Federal Reserve Bank of St. Louis [SEP]
- Meslier, C., Tacneng, R., Tarazi, A. 2014. Is bank income diversification beneficial? Evidence

- from an emerging economy. *Int. Financial Markets, Inst. Money* 31 (3), 97–126. ^[1]_[SEP]
- Mishkin, F., Matthews, K., and Giuliadori, M. (2013). *The Economics of Money, Banking and Financial Markets* (European edition). Harlow: Pearson Education LTD.
- Oluitan, R. and Balogun, M. F. (2018). Income Diversification and Financial Stability of Banks in Nigeria. *IJRDO-Journal of Business Management*, vol 4, issue 3.
- Oluwaseyi, O., Aminul, M. D., Marniati, I., and Nurulul, R., (2021). The Effect of Revenue Diversification on the Firm Value and Stability of Banks: A Comparative Study of Nigerian and Malaysian Banks. *Banks and Bank Systems*, 16(3), pp.141-51.
- Pennathur, A. K., Subrahmanyam, V., and Vishwasrao, S. (2012). Income diversification and risk: does ownership matter? An empirical examination of Indian banks, *Journal of Banking and Finance* 36(8): 2203–2215. <http://dx.doi.org/10.1016/j.jbankn.2012.03.021>
- Raei, R., F. B., Safizadeh, M. and Raei, F. (2016). Study of the Relationship between Credit Diversification Strategy and banks' credit risk and return: Evidence from Tehran Stock Exchange (TSE). *Procedia Economics and Finance*. Vol. 36, pp. 62 – 69.
- Rao, P., Yue, H and Zhu, J (2015). An investigation of credit borrower concentration. *Journal of Banking and Finance*. Vol. 54, pp. 208–221. ^[1]_[SEP]
- Rossi, S. P. S., Schwaiger, M. S., and 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. <http://dx.doi.org/10.1016/j.jbankn.2009.05.022>
- Rhema, E. U., Okoye, E. I., and Ambrose, A. O. (2021). Income Diversification and Financial Performance of Selected Deposit Money Banks in Nigeria. *International Journal of Applied Management Sciences and Engineering*, 8(1).
- Salehi, M. (2008). The Role of Financial Intermediaries in Capital markets. *Zagreb International Review of Economics and Business*, Vol. 11, No.1, pp97-109.
- Sanya, S. and Wolfe, S. (2011). Can banks in emerging economies benefit from revenue diversification? *Journal of Financial Services Research*, 40, 79-101.
- Sawada, M. (2011). How does the stock market value bank diversification? Empirical evidence from Japanese banks. Available from internet: <http://mpra.ub.uni-muenchen.de/id/eprint/45852>.
- Sibel, Y., Turkmen, S.Y., and Yigit, I. (2012). Diversification in Banking and its Effect on Banks' Performance: Evidence from Turkey. *American International Journal of Contemporary Research*, Vol. 2 No. 12.
- Singh, R. I. (2014). Effect of Loan Diversification on Risk and Returns: An Empirical Study of Central Cooperative Banks in Punjab. *Journal of Finance and Bank Management*, Vol. 2, No. 2, pp. 27-41.
- Sissy, M.A., Amidu, M., and Yindenaba, J., (2017). The effects of revenue diversification and cross border banking on risk and return of banks in Africa. *Research, International Business and Finance*. Vol. 40, pp. 1–18.
- Shim, J. (2019). Loan portfolio diversification, market structure and bank stability. *Journal of Banking and Finance*, 104, 103-115.
- Stiroh, K.J. (2004). Do community banks benefit from diversification? *Journal of Financial*

- Services Research*, 25(2/3), 135-160.
- Stiroh, K.J. and Rumble, A. (2006). The dark side of diversification: The case of U.S. financial holding companies. *Journal of Banking & Finance*, 30(8), 2131–2161. ^[L]_[SEP]
- Stomper, A. (2006). A theory of Banks' Industry Expertise, Market Power and Credit Risk. *Management Science*, Vol. 52, No. 10, pp. 1618-1633.
- Turkmen, S. Y., and Yigit, I. (2012). Diversification in Banking and its Effect on Banks' Performance: Evidence from Turkey. *American International Journal of Contemporary Research* Vol. 2 No. 12
- Tabak, B., Fazio, D., and Cajueiro, D., (2011). The effects of loan portfolio concentration on Brazilian banks return and risk. *Journal of Banking and Finance*. Vol. 35, pp. 3065–3076.
- Ugwuanyi, O.G. and Ugwu, N.J., (2012). The Effect of Corporate Diversification on the Profitability of the Financial Services Sector in Nigeria. *World Academy of Science, Engineering and Technology International Journal of Economics and Management Engineering*, 6(7), pp.1729-33.
- Wagner, W. 2007. The liquidity of bank assets and banking stability. *J. Bank. Finance* 31 (1), 121–139.
- Winton, A. (1999). Don't put all your eggs in one basket? Diversification and specialization in lending. Center for Financial Institutions Working Papers 01- 16, Wharton School Center for Financial Institutions, University of Pennsy. ^[L]_[SEP]
- Yang H. F., Liu, C. L, and Chou, R. Y. (2019). Bank Diversification and Systemic Risk, *Quarterly Review of Economics and Finance* (2019). doi: <https://doi.org/10.1016/j.qref.2019.11.003>
- Zhou, K. (2014). The Effect of Income Diversification on Bank Risk: Evidence from China. *Emerging Markets Finance and Trade*, 50 (Sup3): 201-213.