Portfolio Diversification and Performance of Deposit Money Banks: Analysing the Nigerian Banking Industry

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The focus is on Portfolio Diversification and Performance of Deposit Money Banks: analyzing the Nigerian banking industry for the period 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 as proxy for performance of deposit money banks for the periods under review. In the course of the study, data were obtained from the website of Central Bank Statistical bulletin and annual report of Nigerian Deposit Insurance Corporation (NDIC). The Augmented Dickey Fuller (ADF) test option was used to test for unit roots. The ARDL and Bounds test were used to estimate the short and long run relationships respectively. The study discovered that at short run, treasury bills, and ordinary shares are negatively related and not significantly related to return on equity while investments in subsidiaries and foreign balances outside Nigeria are positively related to 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 relationship was also observed to exist amid treasury bills, acquisition of ordinary shares, investment in subsidiaries, ,foreign investments outside Nigeria and performance of all deposit money banks in Nigeria for the period 1990 – 2019.at short run, DMBs should diversify into

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investments in subsidiaries , as this would improve return on equity. Deposit Money Banks should also diversify into foreign holdings that would yield positive net present values. Deposit money Banks in Nigeria should diversify into foreign investments with the right mix   that would increase performance. These were some of the recommendations proffered, to the Government, monetary authorities, Central Bank of Nigeria, researchers and Deposit Money Banks in Nigeria.

1. INTRODUCTION

The concept of portfolio diversification and performance is not strange to history. In the works of Cernas [1]. "Portfolio diversification continues to be a strategy employed by a majority of business globally in the business world. Among the main institutions practicing the same are banks". Perez [2] argues that commercial banks need to have many portfolios that are well diversified and can earn more income, especially in periods of increasing adoption and utilization of technology – enabled products and services. This is based on the fact that different portfolios achieve different performance when subjected to different economic conditions.

The banking industry has evolved over time with the use of technological innovations like the use of Automated Teller Machines, Point of Sale, internet banking, mobile banking, emails, remita payment system, and so on. DMBs diversify in line with innovations and geographical spread. Olarewaju, Stephen and Mabutho [3] in their submission attest that banks diversification as a strategy is not portend a negative option, however, the idea of diversification could increase the exposure to operational diversification risk. This can however be mitigated by strong management expertise to ensure success and possibility of a stable financial position and overall survival.   They maintained that for diversification to attain its desired goals, frequent checks and monitoring of the market portfolios so as to reduce risk and maximize returns [4-7].

The chronology of banking activities in Nigeria has revealed the way deposit money banks have evolved from traditional banking practice of granting of commercial loan to earn interest and intermediation role of bridging the gap between surplus and deficit units of the economic system. The banking sector has witnessed high level of portfolio diversification as observed in the statements of financial positions of DMBs [8,9]. The statements of financial positions of the banks in Nigeria reports high level of non-performing loans, investments in subsidiaries, claims with CBN, foreign currency holdings, quoted investments with the private sector financial derivatives, asset size etc. All these are aimed at ensuring that DMBs in Nigeria diversify its products and services with the view of making returns [10,11].

The African financial research space has recorded handful of works on Portfolio diversification by banks as it affects performance. A particular study in Kenya was critically considered. Gerald [12] in his study captioned 'Portfolio Diversification and financial performance of DMBs at Kenya, (2013 to 2017) using regression analysis. The outcome of the research indicates a strong positive relationship amid Portfolio Diversification and DMBs Performance at Kenya.

Furtherance to the above study by Gerald [12] a critical study into the Deposit Money Banks in Nigeria became necessary considering different portfolio diversifications invested in the financial system. To this end this study is carried out to find out if portfolio diversification correlates with Performance of DMBs in Nigeria as it was discovered in Kenya, considering time range of 1990 to 2019.

The study has five sections, section two, which is a review of related literature, follows this introduction.   Methodology of the study is discussed in section three. Section four dwells on analysis, interpretation and discussion of results thereof, while section five concludes the study and proffers recommendations.

2. REVIEW OF RELATED LITERATURE

In this section we shall be considering conceptual review, theoretical review and empirical review as they relate to the study.

2.1 Conceptual Review

2.1.1 Portfolio Diversification

Portfolio Diversification as claimed by Sullivan and Sheffrin [13] involves strategic capital

allocation in an efficient and effective manner aimed at minimizing exposure to business threat. The writers further affirmed that portfolio diverseness aims to lesson susceptibility to uncertainty by investing in different categories of investment opportunities in unrelated industries.

Portfolio is a bundle or a combination of individual assets or securities. Portfolio theory provides a normative approach to investors to make decisions to invest their wealth on assets or securities under risk. Berger, Hasan and Zhou [14] in their study of commercial banks in China, looked at four aspects of diversification which includes as loans, deposits, assets, and geographical diversification. In their findings, they established that those facets of diversity are associated to high operational cost and reduced profits. Olweny and Shipho [15] contradicted the above findings, and asserted that income diversification affects banks' profits significantly. Demsetz and Strahan [16] contended that diversification by business organisations is not a product of lower risk. They upheld that DMBs with large holding firms are well diversified than DMBs with small holding firms, this might be so caused by fluctuations of the market.

Portfolio Diversification includes non-interest yielding activities which influence either positively or negatively on performance. Examples of non interest income includes, issuing bank guarantees, letters of credit, import payments, shipping guarantees, advising letters of credit and so on by deposit money banks. The effective management of these non-interest incomes, could decrease risk associated with undiversified portfolio [17-19].

Portfolio Diversification occurs the moment fund managers or investors spread available funds to different categories of investment opportunities. Diversification entails that investor's portfolio doesn't lean too heavily on any single investment. Implying therefore, that investing in other categories of investment opportunities, such as shares, real estate, government bonds, private bonds and so on would increase performance.

Diversification as a strategy, is directed towards minimizing risk by spreading assets and curtail the application of funds on a single investment option, thereby a guarantee, that incomes generated are reinvested to other available investment options in the market [14].

2.2 Types of Portfolio Diversification by Deposit Money Banks

2.2.1 Geographical diversification

The idea of geographical diversification occurs when deposit money banks spread their assets outside their operational base or different geographical areas. The tactics of diversification can be adopted by large banks alongside its core operations. Smaller banks on the other hand tends to be more concentrated in a particular geographical area, instead of spreading to other locations.

2.2.2 Diversification of deposits

Deposit diversification according to Rose and Hudgins [20] encompasses investing bank's funds to different categories of securities at different maturity periods. The use of deposits for investment purposes must match with the maturity period of the class of security. Short term deposits for short term money market securities while long term deposits for long term capital market securities. The authors believes that, the risk of meeting customers withdrawal needs and loan requests can be mitigated by matching deposits against each maturity term of the securities. A further strategy of deposit diversification as stated by Rose and Hudgins [20] can be achieved by acquiring deposits at a minimal rate from individuals; business, public sector or it can be obtained by classifying depositor's funds into demand, savings or time deposits, so as to match with the type of security to be invested.

2.2.3 Credit diversification

Jahn, Memmel and Pfingsten, [21] in their contribution, affirmed that Credit diversification is done by banks aimed at lessening the risk of customers or borrowers defaulting in repaying loans by allocating deposits into different groups or class of credit facilities or establishing new credit facilities. Other strategies according to the researchers could be through specialized lending, screening of customers, qualify customers according to their loan request and ensuring that adequate credit risk administration is carried out, with a view of ensuring stable liquidity for the bank.

2.2.4 Revenue diversification

Another type of diversification is revenue diversification, in the perspective of De Young and Rice, [22] can be attained by variegating the

sources of both interest and non-interest income on the bank's portfolio, as stated by De Young and Rice [22] includes commissions, fees, investing on money market instruments and other revenues that are related alongside specialized essence of banks activities. Mercieca and Wolfe [23] however contend that improving revenue generating points can be accomplished through revenue accumulation.

2.2.5 Portfolio diversification to asset categories

In Portfolio Divestment to different asset categories, requires fund managers or investors to allocate available funds beyond a specific type of security or investment opportunity. Also they are required to determine the percentage of fund to distribute to each category of investment option. Below are some examples of securities which investors can diversify into:

I. Shares or equity in a publicly or privately traded company,

II. Debt Instruments such as government or corporate fixed income;

III. Exchange traded funds- this is a marketable basket of securities that follows an index commodity.

IV. Real estate, land and buildings, natural resources, buildings, agriculture, livestock, solid minerals and water e.t.c.

V. Cash and short-term cash equivalents such as treasury bills, certificates of deposits, money market vehicles e.t.c

VI. Commodities, basic goods necessary for the production of goods and services.(Wikipedia.com)

2.2.6 Diversification on foreign entities

Portfolio diversification across territorial boundaries takes place when deposit money banks or investors, invests outside the domestic country of the investor or bank. In most instances, the investments might be unrelated with the business in the domestic country. The significance of diversification across international boundaries is to ensure that the risk in the home country may not be the same risk in the foreign country. Thus, a bank can still survive as a going concern in spite of any risk, encountered in the domestic country. A deposit money bank for instance can invest in shares in the British stock exchange and earn returns from the investment, during economic meltdown in the Nigerian economy (www.investopedia.com).

2.3 Significance of Portfolio Diversification

2.3.1 Banks with diversified portfolios reduces excessive risk concentration

The risk of lending should be managed at all stages of credit administration. This is necessary because some loans react at different market conditions. The performance of some loans will balance off by other loans that perform better within same period of time. Thus the meaning of this is that when portfolios are diversified can be very strong even if some loans perform badly.

2.3.2 Banks with well diversified portfolios respond better to changing market condition

Highly diversified Deposit money banks respond and survive in ever unstable market conditions. Since business outcomes are uncertain, banks should opt for loans, real estate investments, government bonds, public or private equities and so on. that respond positively to various uncertain business environments.

For instance, a banks list of financial assets with different mix, are indifferent to market irregularity and is implausible to experience much loss in the event of unfavorable market condition.

2.3.3 It could lead to successful alliance

With portfolio diversification, some banks or firms may not be cosy investing in a newly discovered asset class as they might lack expertise in that particular area. They might therefore carry on with loan products which they are used to, thus maintain concentrated loan portfolios. A bank or any other financial institution which intends to expand into the manufacture home lending market, may consider the risks in that venture, which could lead to lower profitability. Therefore, going for loan programs provided by a reputable and reliable indirect lender with plenty of expertise in the sector, would allow a bank or credit firm to indirectly benefit from extensive expertise in applicant screening, loan underwriting, customer communication, payment collection, portfolio performance and compliance monitoring.

2.3.4 Deposit money banks with diversified portfolios can produce substantial returns

The goal of portfolio diverseness is to amid other things; maximize shareholders wealth by ensuring increase in returns on investments. Thus shareholders want high rate in returns, that is the prospect from portfolio diversification. Strategically, allocating funds across broad range of asset class including less traditional loan products such as manufactured home loans is expected to create long term wealth for banks.

2.3.5 It enables banks to meet their financial/ non financial goals.

With portfolio diversification, deposit money banks can strategically meet their portfolios to particular risk tolerances level. This would minimize exposure to market uncertainties. For example, a bank with a low risk tolerance can opt for low-risk, high-yield and high-performing loan products like manufactured home loans provided by an experienced and reputable loan organization [24].

2.4 Demerits of Diversification

Despite the importance of diversification considered earlier, it also expedient to look at some disadvantages of diversification as outlined below:

I.   It is time consuming to manage a wide class of portfolios in different industries.

II. Managing a pool of portfolios of investments of varying categories is also very expensive, and goes with more transaction fees and commissions.

III. A bank that does not have complete information and invests in an unrelated class of investment could result to poor performance.

2.5 Performance

It was Stoner [25] who saw performance by business entities as the capabilities of business concerns to perform profitably, efficiently, effectively and being able to mitigate against all difficult economic conditions, business environment threats while utilizing the available resources and available opportunities to not only minimize cost but to maximize profit. Boru (2011)

maintained that, the performance of a business is relevant as it would reveal whether a firm is profitable or making a loss. Financial ratios parameters can be used to enable stakeholders determine how their businesses are performing [26] such ratios as return on equity (ROE), return on assets (ROA), and Net Profit ratios e.t.c.

2.6 Return on Equity

Return on equity (ROE) represents profitability of shareholders of the firm after meeting all expenses and taxes (Horne & Wachowicz 2005). ROE is net earnings per dollar/ naira equity capital. Higher ROE means better managerial performance. But higher ROE can be due to financial leverage. Higher leveraged firms have higher ROE which increases risk too [27]. Usually ROE is higher for high growth companies. ROE = Net Profit / Shareholders' Equity. This study used return on equity because of its wide acceptability.

- **Relationship between Investments in Ordinary Shares and Performance**

  Some scholars have observed the relationship amid investments in ordinary shares and performance of Deposit Money Banks. Umar and Musa [28] in their study measured the relationship amid firm's stock prices and earnings per share. The study analyzed the impact of firm's stock prices and earnings per share between 2001 to 2009. The results show that firm's EPS has no relationship or significant impact on stock prices and should not be used to predict the behaviour of stock prices in Nigeria.

  The result above by Umar and Musa [28] on investments in ordinary shares does not have significant impact on earnings per share which was the performance indicator for shareholders.

  Kiymaza and Berument [29] also looked at the relationship between acquisition of ordinary shares and performance, they submitted that high levels of uncertainty at securities market are likely to result into low trading, grossly explained by unwillingness of firms to commit their funds into investments. This they said, is likely to have a ripple effect on the indicators of firm performance such as profits, ROE and ROI.

- **Investments in subsidiaries and performance by Deposit Money Banks**

Investments in subsidiaries are financial resources invested externally by a business organization, such type of investment can be referred to as the expansion of the firm into related or unrelated line of business to pursue growth and profit opportunities; whereby the firm's financial, physical and intangible resources are leveraged [30].

Investments in Subsidiaries, in the words of Anderson and Anders (2002) plays a strategic role by influencing performance. The more the strategic relationship amid subsidiary and parent, the more likely the subsidiary will receive support and resources from the parent company to attain high performance. The parent company's strategy might be to access local markets, while others may have as their strategy, to supply and export products, to other subsidiaries [31]. The latter type of investment, have an effect on global operation of the multinational company directly, it can be expected to lead to performance.

- **Foreign Investments and performance**

Investors can derive further diversification gains by investing in foreign securities in view of the fact that they tend to be less closely correlated with domestic securities. For instance, economic environmental threats distressing the Nigerian economy may not affect Britain's economy in the same way. Hence, possessing Britain's stocks gives an investor a small cushion of defence against losses in periods of economic downturn in Nigeria (www.investopedia.com).

Foreign diversification takes place when a firm invests in a market outside its national boundaries. The foreign investments and balances held by deposit money banks make up foreign diversification outside national boundaries. Capar and Kotabe [32], submitted that foreign diversification is a growth strategy that has considerable influence on the firm's performance. Thus it is expected that an increase in foreign investments outside Nigeria would result to a corresponding increase in performance, especially when the risk is not similar with the home country.

2.7 Theoretical Review

2.7.1 Modern Portfolio Theory

The concept of Modern Portfolio Theory as propounded by Harry Markowitzs [33] suggested that institutions can construct portfolios that would give the highest expected returns. The theory, tries to maximize profits in a given portfolio risk or equally reduce the risk in an expected returns, it could be attained by critically selecting various investment options available in the market [34].

2.7.2 Resource Based View (RBV) Theory

The theory on resource based view could be traced to the work of Penrose [35] and put forward by Rubin (1973). The theory is based on the assumption that with deliberate managerial efforts, organizations can achieve sustainable competitive edge over its competitors thereby maximizing returns. The theory buttress further that most firms use this strategy to build barriers, so that resource holders are able to benefir from the competitive advantage against other firms in the same industry. Thus the main aim of the theory lies on the fact that organizations uses productive resources to exploit productive opportunities, to attain growth in the organization.

In the words of Contractor, Sumit and Chin [36] firms enjoys benefits by sharing resources such as vertical integration, technological know-how, pooling together negotiating powers and so on. The theory concluded that organizations diversification strategy across business activities maximize financial performance by exploiting valuable resources at their disposal.

2.7.3 Agency Cost Theory

Agency Cost theory attempts to explain the relationship between two parties; the principal and the agent in a given business transaction, it is often referred to as agency dilemma. The dilemma occurs where the agent makes decision or acts on behalf of the principal in a way and manner that contradicts the interest of the principal. The dilemma arises when the agent acts in his or her best interest which does not align with the interest of the principal, thus

creating a gap between goals and desires between agent and principal in an organization.

Owies [37] submitted that managers (agents) diversify the resources of an organization for their own interest. He further asserted that managers diversify organizations resources to increase their power and prestige, boost their own compensation package, make themselves more secure, by investing in businesses which would require their skills with the view of reducing their own employment risk. Another author, Lindgren (2005) strengthened the position of Owies [38], that diversification has no intension for maximization of value and increasing performance. The theory concludes that it reduces the value of the organization instead of increasing it due to the agency interest and its associated cost.

2.7.4 Capital Market Theory

The capital market theory as postulated by Markowitz explains how rational investors should build efficient portfolios. The capital market theory shows the relationship between rate of returns which investors seek and likewise the inheritance of risk that comes along. The investors who are rational would seek to invest in financial assets with high returns. The capital market theory agrees as a proposition when valuing financial assets describing how different assets need to be priced in the capital market. It also describes and evaluates the advancement of capital and financial market over a certain period of time.

2.8 Empirical Review

Sibel and Ihsan [38] conducted a study on Banks Diversification and its effect on financial performance in Turkey. Regression analysis was used to estimate the equation; the result indicates that geographical diversification increases banks performance.

Gerald [12] discovered in his study on Effects of Portfolio Diversification on Financial Performance of commercial Banks in Kenya. Forty (40) Commercial Banks in Nairobi, Kenya, were analyzed for the period 2013-2017. Descriptive and regression analysis were adopted as the tool of analysis. The result shows a strong positive relationship amid portfolio diversification and Performance of commercial banks in Nairobi Kenya for the period reviewed. A weak positive correlation was also found between bank size and commercial banks performance in Nairobi, Kenya.

The study by Saoussen & Dominique [39] also shows empirical review on diversification. The study examined shift into non-interest based activities of banks and financial performance of banks in East Asia, for the period 1997-2007. A total of 714 banks were sampled. The study used the basic Herfindhal-type approach for the analysis. The result of the study showed that diversification gains are more than offset by the cost of increased exposure to the non-interest income, specifically by the trading income volatility.

From the work of Yan, Talavera and Fahretdinova [40] they examined the effect of product diversification on profitability of banks in Azerbaijan. The study used data for six different types of loans and four types of deposits. The result of the study showed a negative relationship amid loan-based portfolio diversification and bank profitability. It was also revealed that deposit- based diversification had a positive correlation with profitability of the banks in Azerbaijan.

Stiroh [41] assessed the potential benefit of diversification for US banks engaged in non interest activities for the period 1984-2001, shows that net interest income and noninterest income (which is relatively more volatile) are increasingly correlated (lower diversification benefits).

The impact of bank size and funding risk on bank stability was examined by Michael [42] in Ghana. The researcher obtained data from the rural banking industry in Ghana. Ratio analysis and z-score was used as method of analysis. The findings of the study suggest a linear relationship amid size of rural banks and stability of the banks. Implying however that, an increase in the size of a rural bank will cause a corresponding increase in bank stability, it also revealed that the risk of funding impacts positively on bank stability in Ghana.

In their investigation Turkmen and Yigit [43] looked at Sectoral and Geographical credit diversification on the performance of Turkish Banks, for the period 2007-2011. Forty (40) Turkish banks were used as the sample size. The study adopted Herfindahl=Hirschman Index as tool of analysis. The outcome of the study showed negative relationship amid sectoral and

geographical diversification and performance. The researchers argued that the negative correlation is related to increase in cost of diversification, which offsets the benefits of thereof.

The empirical study of Acharya and Saunders [44] also comes to focus. The researchers studied on the impact of loan portfolio diversification on performance of Italian banks . The study made use of Herfindahl-Hirschman Index (HHI) as a measure of loan portfolio diversification across different industries and sectors. The result indicates that diversification does not lead to increased performance, neither does it lead to the safety and sound health of the bank. It was also noted that banks with a high credit risk in their loan portfolio experienced poor bank performance via portfolio diversification.

Olu [45] in his study on impact of diversification and performance of firms, the researcher used regression analysis to estimate the equation. The study indicated a correlation coefficient of r =0.851 (r-squared) and r=0.823 (adjusted r-squared) representing a strong positive relationship between geographical diversification and firms performance.

Iqbal, Hameed and Qadeer (2012) researched on the impact of diversification on firms' performance in Pakistan for the period 2005-2009. The study used a sample of forty (40) companies in Pakistan and relied on secondary data for the study. The result showed that positive relationship was not found amid diversification and firms' performance.

In the work of Makhoha, Namusonge and Sakwa [46] the researchers conducted a study on portfolio diversification and financial performance of commercial banks in Kenya. The researchers used primary data and administered questionnaires and interviewed 133 bank managers randomly and 43 commercial banks. The study concluded that portfolio diversification positively relates with financial performance and is a significant predictor of the movement of financial performance of commercial banks in Kenya.

The study by Ammar and Boughrara [47] may not be different from Saoussen & Dominique [39]. The critically considered the effect of revenue diversification on bank performance from 1990 to 2011 in Middle East and North African countries. A sample size of 275 banks

were used. The researchers used Generalized Method of Moments (GMM) technique to estimate the equation. The outcome of the study showed that diversification improves bank profitability. They also assert that trading-generating business lines contribute to profitability and stability.

Non-interest income and profitability of Indian banks was studied by Ahamed [48] for 2006 to 2015. A total of 16 banks were studied using multiple regression analysis to estimate the equation. The Findings of the study showed that higher share of non-interest income yields higher profits when banks are involved in more trading activities. The results indicate that private foreign banks perform better compared to public sector and private domestic banks. It was also found that income diversification benefits more to the banks that have lower asset quality compared to the banks that have higher asset quality.

Further studies by Saunders, Schmid, and Walter (2016) on diversification of banks across non-traditional interest generating businesses and bank profitability for the period 2002-2013. A sample of 10,341 US banks was examined, using multiple regression technique to estimate the equation. The researchers discovered that a higher ratio of non-interest income (derived from fees and non-core activities such as investment banking, venture capital and trading) to interest income (associated with deposit-taking and lending to retail and commercial clients) was related to greater profitability and overall performance.

3. METHODOLOGY

This section contains how the data was collected, designed, model specified, and preliminary tests conducted.

3.1 Data Collection

The data for this study were basically sourced from the website of the central bank of Nigeria (CBN) statistical bulletin and annual report of NDIC obtained from their website, from 1990 to 2019.

3.2 Research Design

The design of this study is quantitative as it is meant to collect and analyze the data on the relationship between the variables; diversification

by DMBs and Returns. The study identified four proxies for Portfolio diversification; Treasury bills, ordinary shares, investment in subsidiaries, and foreign investments outside Nigeria while returns on equity as proxy for Performance in Nigeria.

3.3 Model Specification

Model specification is a mathematical expression used to measure the economic relationship between variables (dependent and independent variables). In this case we specify a functional and econometric models for the dependent and independent variables of the study.

ROE= f(TB,OS,INVS,FION,)…………..(1)

Assuming a linear relationship amongst the variables, the econometric relationship of the functional form is written as follows:

LnROE= β0 + β1LnTB + β2LnOS + β3LnINVS + β4LnFION +U…….(2)

Where:

ROE= Return on Equity
Ln ROE= Natural log of return on equity
TB= Treasury bills
LnTB=natural log of Treasury bills
OS= Ordinary shares
LnOS= natural log of ordinary shares
INVS=Investments in subsidiaries
LnINVS= natural log of investments in subsidiaries
FION= Foreign Investments held outside Nigeria
LnFBON= natural log of Foreign balances held outside Nigeria
U= stochastic error term
B0, = constant
b1, b2, b3, b4, = coefficients and are the parameters to be estimated

3.4 Data Analysis Technique

There are different statistical tools of analysis in statistics, econometrics tool of analysis deals with the measurements of economic relationships. Frisch and Bjerkholt (1995) asserts that econometrics aims to give empirical content to economic relations for testing economic theories, forecasting, decision making and for policy evaluation. Econometrics can also be defined as deriving economic relations, by applying mathematical and statistical methods to data, thus it aids in both analyzing the impact of an existing phenomenon and testing a given hypothesis (gementstudyguide.com).

The data type of this study which is a time series data will be analyzed using the econometric statistical tool. The e-views 10 version will be used as the software to run the regression analysis.

3.5 Pre-Test

The following pre-test was conducted to ascertain the validity and global acceptability of the variables used as candidates for the selected model.

3.5.1 Test for stationarity (Unit Root test)

The test for stationarity of the data is one of the assumptions of an econometric model. It would reveal whether the data are stationary at order zero i.e. i(0), first difference order one i.e.i (1) or a mixed order of integration. It is expected that the outcome of the pre -test would reveal the statistical tool that would be used to estimate the equation.

The short-run tests, Long-run test, autocorrelation test and the granger causality tests were conducted.

These tests would eventually reveal whether there exists, a long run relationship between two or more co-integrating variables in the estimated equation.

4. ANALYSIS AND RESULTS

4.1 Test For Stationarity (Unit Root Test)

The Augmented Dickey-Fuller test statistic was chosen to test for stationarity of the data. The following results were obtained from e-views 10 version.

The test result below shows the order of stationarity (unit root) of the dependent and independent variables. While ROE, and TB are stationary at level 1(0), OS, INVS and FION are stationary at   first difference 1(1). This implies that the regression equation would be estimated using Auto Regressive Distributed Lag (ARDL), due to the mixed order of integration.

4.2 Interpretation of Result

4.2.1 Auto regressive distributed lag (ARDL) test result

The table below shows the test result obtained from the e-views 10 software indicating the short run relationshtp amid dependent variable and the expanatory variables.

Table 1. Results of the Augmented Dickey-Fuller Unit Root

Variables	ADF test statistic at		Critical values	Order of integration
	LEVEL	**1ST DIFF**		
LnROE	-4.607216		-3.699871	1 (0)
			-2.976263	
			-2.627420	
LnTB	-3.301513(pro.0.0249		-3.699871	1 (0)
			-2.976263	
			-2.627420	
LnOS		-6.487025	-3.711457	1 (1)
			-2.981038	
			-2.629906	
LnINVS		-8.120116	-3.711457	1(1)
			-2.981038	
			-2.629906	
LnFION		-9.624682	-3.689194	1(1)
			-2.971853	
			-2.625121	

Source: Researchers 'Compilation from e-views 10

4.3 Interpretation of Results

From table two, the short run result shows R-sqaure at 0.997502 while the adjusted R-sqaured shows a percentage of 0.950033. This implies that the predictor or independent variables account for 95% changes in the performance of DMBs, thus are good enough to predict the movement of the dependent variable. Thus TB, OS, INVS, and FION are best fits to predict or influence the direction of Return on equity of DMBs in Nigeria.

At lag 1, 2 and 3, the result shows that diversifying into Treasury bills has a negative relationship with return on equity with -0.939023, -0.391749 and -1.206200 respectively thus a 1% increase in treasury bills will lead to -0.939023, -0.391749 and -1.206200 decrease in return on equity. At same lag periods, the probability values are all greater than the 5% critical level, an indication that diversification through treasury bills by DMBs does not significantly predict the movement of return on equity at those lags periods. Thus the null hypothesis is accepted at the short run period.

At lags 1 and 2, the result shows that diversification through acquisition of ordinary shares has a negative relationship with return on equity with -0.670321, and -0.356110, thus a 1% increase acquisition of ordinary shares will lead to -0.670321, and -0.356110, decrease in Return on equity at those lag periods. At lag 3 however, the result revealed a positive correlation with return on equity with 0.3824, thus a 1% increase in acquisition of ordinary

shares leads to 0.382416 increase in return on equity. The probability values however do not indicate significant relationship as the values are all greater than the critical values. The short run period does not show significant relationship between the variables. Therefore, the null hypothesis is accepted at 5% level of significance.

At lag 1, the result shows that investments in subsidiaries by DMBs has a negative relationship with return on equity with -1.149670, thus a 1% increase in investment in subsidiary will lead to -1.149670 decrease in Return on equity. At lags 2 and 3, a positive relationship was observed at 0.026870 and 0.463921 respectively. Thus a 1% increase in investments in subsidiaries would lead to 0.026870 and 0.463921 increase in return on equity. No significant relationship was found as the probability values are all greater than the critical value. We conclude that the null hypothesis is accepted

At lags 1 and 2 foreign Investments outside Nigeria by DMBs are seen to be positively related to returns on equity. The results show 0.207947 and 1.535950, an implication that a 1% increase in FBON will lead to an increase in return on equity at 0.207947 and 1.535950 of deposit money banks in Nigeria. Therefore the null hypothesis is rejected at 5% level of significance.Their probability values are all greater than the critical value of 5%. Thus we conclude that FBON does not significantly predict the direction of return on equity of DMBs in Nigeria. The null hypothesis is accepted.

Table 2. Showing ARDL result

Dependent Variable: LNROE
Method: ARDL
Date: 07/25/21   Time: 07:08
Sample (adjusted): 1995 2019
Included observations: 21 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): LNTB LNOS LNINVS LNFION
Fixed regressors: C
Number of models evaluated: 768
Selected Model: ARDL(3, 3, 3, 3, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNROE(-1)	-0.043665	0.169837	-0.257098	0.8398
LNROE(-2)	0.309119	0.099627	3.102775	0.1985
LNROE(-3)	-0.041052	0.077368	-0.530608	0.6894
LNTB	1.594128	0.407896	3.908171	0.1595
LNTB(-1)	-0.939023	0.248640	-3.776636	0.1648
LNTB(-2)	-0.391749	0.324590	-1.206903	0.4405
LNTB(-3)	-1.206200	0.242509	-4.973826	0.1263
LNOS	0.530996	0.231135	2.297338	0.2614
LNOS(-1)	-0.670321	0.231739	-2.892570	0.2119
LNOS(-2)	-0.356110	0.150272	-2.369768	0.2542
LNOS(-3)	0.382416	0.098466	3.883735	0.1604
LNINVS	0.927198	0.453031	2.046653	0.2893
LNINVS(-1)	-1.149670	0.418304	-2.748411	0.2222
LNINVS(-2)	0.026870	0.319363	0.084136	0.9466
LNINVS(-3)	0.463921	0.408663	1.135217	0.4597
LNFION	-0.411212	0.626469	-0.656397	0.6302
LNFION(-1)	0.207947	0.378245	0.549768	0.6800
LNFION(-2)	1.535950	0.496847	3.091394	0.1992
LNFION(-3)	-0.901568	0.536261	-1.681211	0.3416
C	4.163903	4.060518	1.025461	0.4920
R-squared	0.997502	Mean dependent var		3.256796
Adjusted R-squared	0.950033	S.D. dependent var		0.986417
S.E. of regression	0.220496	Akaike info criterion		-1.325636
Sum squared resid	0.048618	Schwarz criterion		-0.330853
Log likelihood	33.91918	Hannan-Quinn criter.		-1.109743
F-statistic	21.01409	Durbin-Watson stat		2.413152
Prob(F-statistic)	0.170358			

Source: Researchers' desk e-views 10 output

4.3.1 Long run bounds test result

The bounds test result as shown in table 3 revealed an F –statistic value of 18.97694 which is greater than the upper bound of 3.49 at 5% level of significance. The null hypothesis is rejected at 5% level, and we conclude that there is a long run relationship between all the independent variables; Treasury bills, ordinary shares, investment in subsidiaries, and foreign balances outside Nigeria for the period studied.

4.3.2 Autocorrelation–durbin watson

The result of the Durbin Watson statistic shows a 2.413152 this means that there is no presence of autocorrelation in the data. Thus, the model satisfies global criteria for the test of the

presence of autocorrelation as one of the regression assumptions.

4.3.3 Granger causality test result

The granger causality results above show that bi-directionally TB does not granger cause ROE at 0.3515 and 0.0823 respectively the probability values are higher than 5% level of significance. We observe also that bi-directionally OS does not granger cause ROE at 0.2578 and 0.5902 respectively. Unidirectional causality was observed between INVS and ROE AT 0.0444. bidirectional causality was found amid INVS and FION. FION also granger causes OS and INVS as the values are all lower than the 5% critical level.

5. DISCUSSION OF FINDINGS

The findings above has shown that portfolio diversification through treasury bills, acquisition of ordinary shares, investments in subsidiaries, and foreign balances outside Nigeria all jointly predict the movement of return on equity of DMBs. At short run negative relationship was found between Portfolio diversification into treasury bills return on equity, at all three lag periods. The result also show that DMBs diversification via treasury bills does not significantly predict return on equity. This suggests that divesting into Central Bank of Nigeria treasury bills, at the short run would result to drop in return on equity by DMBs. These are government securities, which at short run return on investment may not be guaranteed. This result points to the Modern portfolio theory as propounded by Harry Markowitzs where he suggested that institutions should construct portfolios that would give the highest expected returns at a managerial risk level. The theory, tries to maximize profits in a given portfolio risk or equally reduce the risk in a given level of expected returns, this can be achieved by carefully selecting proportion of various investments. So DMBs should select short term securities that would yield highest level of returns at short run period in other to meet liquidity needs.

Table 3. Long run result

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0) Asymptotic: n=1000	I(1)
F-statistic	18.97694	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	21		Finite Sample: n=35	
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532

Source: Researchers' Desk – e-views 10 ARDL output

Table 4.

Pairwise Granger Causality Tests
Date: 08/04/21 Time: 16:22
Sample: 1990 2019
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNTB does not Granger Cause LNROE	25	1.10219	0.3515
LNROE does not Granger Cause LNTB		2.83617	0.0823
LNOS does not Granger Cause LNROE	23	1.46285	0.2578
LNROE does not Granger Cause LNOS		0.54303	0.5902
LNINVS does not Granger Cause LNROE	23	3.72000	0.0444

Source: Researchers' Desk – e-views 10 output

The study also revealed that DMBs diversifying into acquisition of ordinary shares at the short run period has a negative relationship with return on equity and not a significant predictor of return on equity. Thus buying ordinary shares of quoted companies, at the short run will not yield return on equity as ordinary share capital are long term in nature and as such may not produce the needed dividend. Other capital market options such as Preference shares in unquoted companies, and debentures corporate bonds, are available. Remember that financing decisions are managerial decisions under the control of the directors of Deposit Money Banks in Nigeria, if there are conflict of interest, or agency problems arising between directors and shareholders of DMBs then a financing option taking that is against the interest of shareholders would result in negative ROE at the short run period.

This result aligns with agency theory which describes a situation where agent (directors) will act contrary to act in his/her best interest which is unaligned to those of the principal (shareholders) hence, creating a problem due to differences between goals and desires of principal and agent. According to Owies [37] Managers diversifies to maximize their own benefits even at the expense of shareholder's interest; diversify to increase their own power and prestige, to boost their own compensation, to make themselves more secure by investing in projects that require their specific skills or to reduce their own employment risk (risk of losing their job or professional reputation). Lindgren (2005) Suggested that the agency view on diversification has no motive for value maximization and increasing in profits. This might have accounted for the negative performance observed in diversification through acquisition of shares. However, at lag 3 a positive relationship was established between ordinary shares and return on equity.

Our findings also show that at two lag periods positive relationship was observed amid investments in subsidiaries and return on equity, however this variable is not a significant predictor of return on equity at those lag periods. We have now noticed that DMBs diversifying into subsidiaries such as mortgages, insurance businesses, and so on improves their return on equity hence their performance at the long run period. The Agency Cost Theory supports this outcome the theory explains the relationship that exists between two parties, that is, the principal and agent in business, also known as agency

dilemma, being a situation where one person or entity called agent is called to make decision on behalf of another party called principal. The dilemma exists in a situation where agent will act contrary to act in his/her best interest which is unaligned to those of the principal hence, creating a problem due to differences between goals and desires of principal and agent. Agency theory is concerned with solving the problem. According to Owies [37] Managers diversifies to maximize their own benefits even at the expense of shareholder's interest; diversify to increase their own power and prestige, to boost their own compensation, to make themselves more secure by investing in projects that require their specific skills or to reduce their own employment risk (risk of losing their job or professional reputation). So where the agents who are the directors act for the interest of the shareholders by investing in subsidiaries then there will be an overall performance of the DMB.

Foreign Investments held outside Nigeria has a positive relationship with return on equity. This was seen in lags 1 and 2. This result agrees with Olu (2009) who discovered that the strategy of portfolio diversification impacts positively on the performance of different firms. He thereafter recommended on geographical diversification in addition to other forms of diversification to ensure maximum performance. The study indicated a correlation coefficient of ($r = 0.851$) representing a strong positive relation between Nigerian companies diversifying their companies and impact of performance as result of such diversification. Also a strong correlation ($r = 0.823$) between importance of diversification and use in modern business

The bounds test result revealed long run relationship between all the explanatory variables and the dependent variables. It showed an f-statistic value which is higher than the upper bound at 5% level of significance. So we are confident that at long run, diversification through treasury bills, ordinary shares, investments in subsidiaries and foreign balances held outside Nigeria would increase return on equity of DMBs in Nigeria, with proper mix of corporate and tactical strategies that will ensure effective and efficient management of resources based on decisions that would improve performance and ensure financial stability and survival. Also ensuring that all issues on agency conflict or delimma and are resolved aimed at maximizing overall objectives of the Bank.

The granger causality results shows bi-directionally treasury bills does not granger cause return on equity at 0.3515 and 0.0823 respectively the probability values are higher than 5% level of significance. We observe also that bi-directionally ordinary shares does not granger cause return on equity at 0.2578 and 0.5902 respectively. Unidirectional causality was observed between INVS and ROE AT 0.0444. bi-directional causality was found amid INVS and FION. FION also granger causes OS and INVS as the values are all lower than the 5% critical level.

6. CONCLUSION

The study on Portfolio Diversification and Performance of deposit money banks has shown that portfolio diversification has positive and negative relationship with returns on equity at some lag period of the study especially at short run. It also revealed that long run relationship exist amid, variables that predict performance of DMBs in Nigeria. It reaffirms the extent to which the strategy of Portfolio diversification can mitigate against risk experienced by DMBs and ensure financial survival and stability. This serves as a wakeup call for deposit money banks in Nigeria to invest in portfolios of assets that would give positive returns to meet the overall objectives of all stakeholders in the banking industry in Nigeria. It is recommended: (1) Deposit money banks in Nigeria should diversify into investments in subsidiaries and foreign investments outside Nigeria as well as consider at the long run periods; treasury bills, acquisition of ordinary shares in quoted companies, investments in subsidiaries and investments in foreign assets with the view to increasing performance. (2) The Government through the Central Bank of Nigeria should implement monetary policies that would strengthen banks diversification through effective supervision and regulation.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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