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Asymmetric Analysis of Macroeconomic and Financial Determinants of Deposit Money Banks Performance in Nigeria

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Abstract:
The performance of the banking industry is influenced by the economic, social, and political context in which it functions. The significant impact of the macroeconomic and financial environment on the performance of DMBs in Nigeria is apparent. The asymmetrical analysis of macroeconomic and financial factors influencing the performance of DMBs in Nigeria was investigated in this study. The researchers decided to use an ex-post-facto design. The data used in this study were obtained from the CBN annual statistics bulletin and the NBS. The NARDL methodology was used to conduct data analysis. The individual is referred to as Phillip-Peron. Unit root tests have shown a varied level of integration, although co-integration. The use of bounds testing methodology has provided evidence supporting the presence of a long-term association between the independent and dependent variables. The results indicate that the gross domestic product and all share index of the capital market have a favorable impact on DMBs in Nigeria. Conversely, inflation, monetary policy rate, and private sector credit have a negative influence on DMBs in Nigeria. The study recommended, among others, that the Federal Government should be committed to implementing economic policies aimed at accelerating rapid economic growth for the enhanced performance of DMBs in Nigeria, and the CBN should be more dynamic and strategic with the monetary policy rate (MPR) to ensure an efficient interest rate charged by DMBs.

Keywords: *Determinants, financial asymmetric analysis, macroeconomic determinants, deposit money bank*

1. Introduction

The preponderance of evidence on banking crises in Nigeria has shown that deposit money banks (DMBs) are susceptible to significant factors despite the 2004 consolidation of Nigerian banks. It is, therefore, imperative that the performances of the DMBs be kept under close surveillance at all times (Echekoba, Egbunike & Ezu, 2014). One potential approach to accomplishing this objective is evaluating the many elements that influence the operational effectiveness of deposit money institutions within the Nigerian context. This is mostly due to the significant function that the banking system fulfills in facilitating the transfer of cas from entities engaged in saving to those engaged in spending. To illustrate many key points, an efficient financial system should demonstrate profitability enhancements, augment the magnitude of cash transferred from savers to borrowers, and provide superior quality services for customers. Banks assume a crucial role in the functioning of an economy as financial intermediaries (Olaoye & Olarewaju, 2015).

By virtue of the services DMBs render and their roles in the economy, they tend to have many, yet diverse, stakeholders (such as depositors, borrowers, government, employees, and auditors, among others) who affect and are affected by the activities of these banks, hence the need for performance assessment, as doing this provides the stakeholders with the flow of information necessary to guide their decision-making process. When these banks are unsound, unstable and unhealthy, that is, if they do not make an adequate profit, the stakeholders' interests are jeopardized (Oniore, Ogwuche & Alegu, 2023). The actions of DMBs are influenced by the socio-political, financial, and industrial context inside an economy. Undoubtedly, a macroeconomic climate characterized by financial volatility hinders the functioning of deposit money institutions.

Thus, the drivers of banks' performance exhibit variation among different banks owing to disparities in shareholder and management choices and actions.

In a dynamic country such as Nigeria, the success of DMBs is significantly influenced by several macroeconomic variables, including inflation, currency rate dynamics, economic growth, and interest rates, among others. According to the research conducted by Edeh, Obijiofor, Edeh, Obi, and Mbaeri (2020), the presence of favorable macroeconomic circumstances has a positive impact on the growth and progress of the banking system. Conversely, negative macroeconomic conditions might have detrimental effects on the banking sector's performance. Moreover, the

performance of domestic banks might be impeded by spillover effects resulting from financial crises, particularly in developed financial markets of other nations around the globe.

The dynamics in the financial sector, and indeed, the capital market, also determine, to a large extent, the level of performance of DMBs, such as monetary policy rate, financial sector growth, and stock market development. This can be attributed to the complexities in the structures and operations of DMBs, precipitated by the effect of intensifying globalization, and this makes it crucial to continually x-ray the array of determinants of DMB performance to determine their profitability (Rahman & Islam, 2018).

Although the performance of DMBs is greatly impacted by the macroeconomic and financial environment, previous research has primarily focused on bank-specific factors measured by the CAMEL model. As a result, there is a lack of studies examining the influence of macroeconomic and financial determinants such as GDP, exchange, inflation, interest, monetary policy rate, financial sector growth, and stock market development. Furthermore, the existing body of research has provided little attention to the collective impact of macroeconomic and financial variables on the performance of deposit money institutions in Nigeria.

The objective of this research is to analyze the collective impact of macroeconomic and financial variables on the performance of DMBs in Nigeria. The research has academic importance as it would provide a policy framework for the Nigerian Banking Industry. This is particularly relevant due to the limited availability of information for policymakers on the collective impact of macroeconomic and financial factors on banks' performance inside the country.

The study starts by establishing a foundation in part one, which is then followed by a comprehensive examination of concepts, theories, and empirical evidence in section two. The subsequent sections of this article are structured as follows: Section three presents the methodology used in this study, empirical findings derived from the analysis are presented in section four, and section five concludes with a summary of the key findings and makes suggestions based on the results.

2. Conceptual Review

The key issues to be elucidated in this section are the concepts of bank performance, macroeconomics, financial sector and the determinants of bank performance.

2.1. Concept of Banks Performance

Performance, in a broad sense, may be described as the successful attainment of the predetermined goals established by an organization, such as a bank, within the agreed-upon timeframe and with low expenditures, all while effectively using the available resources. The performance might include several aspects, such as the company's profitability or competitiveness, the workplace environment, or the service quality offered to customers. The notion emerged due to the diverse composition of groups inside the organization, leading to many potential methods.

Profitability is intricately linked to the concept of profit, although with a crucial distinction. While profit represents a definite and quantifiable value, profitability is a concept that is contingent upon comparison and comparable assessment. The statistic used to assess the magnitude of a company's profitability relative to its scale of operations. Profitability is a metric that gauges the level of efficiency inside an entity, eventually determining its degree of success or failure. Profitability may be further defined as the capacity of a firm to generate a financial gain on an investment and/or ownership interest, according to its available resources, compared to other potential investment opportunities. While a corporation may provide a positive financial outcome, it does not automatically indicate that it is operating with profitability (Zainol & Kassim, 2010).

2.2. Measurements of Banks Performance

The assessment of performance, akin to a control and management mechanism, serves as a means to direct the actions of individuals within an organization and incentivize their engagement. Consequently, the facilitation of improvement necessitates the availability of a mechanism for obtaining feedback on performance since measurement serves as the first stage in the enhancement process. There are two fundamental categories of bank performance assessment. The first category pertains to outcomes, whereas the subsequent category concerns financial metrics. The former concentrates on the factors influencing outcomes, including non-financial indicators like quality, utilization of resources, innovation and adaptability. This implies that, within the context of performance evaluation, the establishment of metrics may be centered on the notions of outcomes and measures. Indeed, there exists a progression of performance models according to financial metrics. Consequently, several research endeavors have used specific benchmarks, such as profitability measures, including ROA, ROE, and cost-efficiency, to assess the performance of banks (Hajer & Anis, 2016).

The term "Return on Asset" pertains to a financial metric that signifies the profitability of a firm relative to its overall assets. ROA may be used by corporate management, analysts, and investors as a metric to assess the effectiveness with which a firm utilizes its assets in generating profitability.

The Return on Equity is a financial performance metric that quantifies the profitability of an organization by dividing its net income by the shareholders' equity. The ROE is often regarded as the measure of return on net assets since it is derived from the difference between an organization's assets and its debt, which is known as shareholders' equity. The term "gross margin" pertains to the financial measure of a company's profitability, calculated by deducting the cost of products sold from the total revenue. The metric in question pertains to the proportion of earnings that a corporation chooses to keep for each additional dollar made.

Net income is a financial metric that indicates the profitability of a firm by deducting all costs from its total revenue. It may alternatively be denoted as "net profit" or "the bottom line."

2.3. Determinants of Banks Performance

The examination of performance determinants in the banking literature has been extensively investigated by Chen (2022), while there is variation in the use of performance proxy across different research. This research examines the drivers of performance in DMBs. These variables are categorized into two groups: macroeconomic determinants and financial determinants. The financial determinants may be further classified as industry-specific or bank-specific. This sub-section provides a detailed discussion of these determinants.

2.3.1. Macro-economic Determinants of Banks Performance

Adeusi and Kolapo (2014) assert that the economic environment encompasses several macroeconomic factors, including but not limited to demand, inflation, fiscal policies, exchange rates, interest rates, monetary policies and GDP growth. These factors significantly impact the operations of banks. Several determinants are outlined as follows:

2.3.1.1. Gross Domestic Product Inflation Rate

2.3.1.1.1. Monetary Policy Rate

The concept refers to the vulnerability of a bank's financial health to unfavorable fluctuations in interest rates. One significant factor contributing to interest rate risk arises from a prevalent practice among banks, which involves borrowing funds for short periods and extending loans for longer durations. This practice leads to a discrepancy in the maturity of assets and liabilities, often referred to as re-pricing or maturity mismatch (Zainol & Kassim, 2010).

2.3.1.1.2. Exchange Rate

The word "relative price" refers to the value of a particular currency in relation to another currency or a set of currencies.

2.4. Financial Determinants of Banks Performance

The industrial environment of a bank encompasses its rivals, clients (including persons and organizations), and the operational norms, such as the Basel Accord, that are implemented to control and oversee these institutions. The banking sector exerts pressure on banks to enhance the caliber of their financial offerings via competitive forces, while also ensuring compliance with the provisions outlined in their memorandum of association and article of association, as well as adhering to the prevailing banking regulations within the industry landscape. The financial characteristics that are special to the industry of DMBs encompass are:

2.4.1. Stock Market Growth

A stock market index is a methodology used to identify patterns by using historical high and low points in averages as reference points. The assessment of stock market growth may be conducted by the use of two key indicators, namely the All-Share Index (ASI) and the Value of Traded Stock (VTS). The all-share index furnishes data that enables the assessment of the market's future trajectory based on its historical performance. One prevalent use of stock market indexes is the evaluation of portfolio performance. The valuation of shares exchanged encompasses the aggregate quantity of shares traded, including both domestic and international shares, multiplied by their corresponding market values. The process of determining the worth of a stock involves the calculation of the company's price-to-earnings ratio. The price-to-earnings ratio is computed by dividing the stock price of a firm by its most recently disclosed earnings per share (EPS). According to Zainol and Kassim (2010), a low price-to-earnings ratio suggests that an investor who purchases the stock is obtaining a favorable level of value.

2.4.2. Financial Sector Growth

This metric denotes the pace at which the financial sector's ability to fulfill its functions of financial intermediation and regulation is expanding. One approach to evaluating the expansion of the financial sector is determining the extent to which the financial industry provides financial resources to the private sector. Hence, one possible metric for measuring it is the aggregate sum of currency and near-money in circulation.

On the contrary, financial determinants specific to banks encompass various factors. These include asset size, which is determined by the overall market value of the securities held by a fund. Another determinant is asset quality, which serves as a measure of the bank's strength. Additionally, asset structure is another determinant that pertains to the distribution of fixed investment, securities investment, and liquidity investment within the bank. Numerous academic researchers have conducted studies on the composition of assets. According to Yang et al. (2017), the asset structure of bank investments can be influenced by market interest rates and national policies.

2.5. Theoretical Framework

This research is based on the principles of Stakeholder theory, which challenges the conventional belief that the management of commercial entities, such as banks, should only prioritize the pursuit of profit. Jensen (2002) argues that profit maximization is often seen as the "sole objective" of corporations. This aspect has significance as it aims to tackle the sometimes disregarded but relevant sociological inquiry on the impact of companies on society (Stern & Barley, 1995; Hinings & Greenwood, 2003; Laplume, Sompar & Litz, 2008). Freeman's foundational book, "Stakeholder Management: A Stakeholder Approach," published in 1984, was the first comprehensive articulation of the stakeholder paradigm. The

theory derives its foundation from a range of scholarly works, including those on systems theory, corporate social responsibility, and corporate planning, among other relevant areas of study.

DMBs that adopt a stakeholder-based approach prioritize the interests of various entities, including shareholders, depositors, personnel, and business partners. These stakeholders play crucial roles in the banks' overall success. Hence, it is incumbent upon these financial institutions to generate value in an equitable and satisfying manner for all of their stakeholders (Marco & Lucano, 2015). The operations of these institutions have a significant impact on many stakeholders, as is often seen in similar contexts. When these institutions experience failure or are unable to effectively and efficiently execute their operations, the stakeholders bear the majority of the adverse repercussions. One potential strategy for mitigating this situation involves closely monitoring the performances of the DMBs, as suggested by Zainol and Kassim (2010).

2.6. Empirical Review

Extensive research has been conducted on the factors of bank profitability, primarily driven by the recognition of profitability as a crucial driver of corporate growth and a key indicator of corporate success. The following literature review presents empirical investigations conducted by academic experts, which provide evidence in support of the discussed topic.

The study conducted by Okpanachi, Ezie, and Ropheka (2021) investigated the asymmetric impact of certain monetary policy measures on Nigeria's international trade from 1986 to 2020. The empirical study was conducted using the ARDL technique of analysis. In order to mitigate the possibility of false regression outcomes, unit root tests were conducted on all variables included in the research. The findings substantiated the presence of a mixed order of integration across the variables. The results of the co-integration test indicate the presence of a long-term, or equilibrium, link between the chosen monetary policy variables and international trade in Nigeria. The study's findings indicate that asymmetric effects of monetary policy rates significantly influence Nigeria's international trade. The long-term increase in monetary policy rates had a notable adverse impact on Nigeria's foreign trade. The findings indicate that a sustained decrease in the currency rate, often known as a depreciation, has a substantial and adverse impact on Nigeria's international commerce. This implies that the long-term consequence is an increase in the cost of exporting domestically produced commodities. The study revealed that the increase in loan rates had a notable adverse impact on international commerce due to the escalating expenses associated with borrowing and manufacturing. Additional results from the research indicate that the implementation of an expansionary monetary policy, characterized by an increase in the broad money supply, has a substantial and statistically significant impact on Nigeria's international trade in the long term. The implementation of expansionary measures aimed at mitigating the negative effects of an economic downturn or recession resulted in an increase in the amount of foreign commerce within the economy. In contrast, the empirical findings indicate that in the long term, there exists a negative relationship between broad money supply and foreign commerce in the NARDL framework. This implies that a reduction in money supply has an opposite impact on Nigeria's international trade, although the statistical significance of this relationship has not been established.

The study conducted by Odungweru and Ewubare (2020) examined the influence of monetary policy on foreign commerce in Nigeria over the period spanning from 1980 to 2017. The concept of total commerce was used as a measure of international trade, while variables such as money supply, cash reserve ratio, minimum rediscount rate, interest rate, inflation and exchange rate were utilized as independent factors to elucidate the diverse macroeconomic policies implemented in Nigeria. The time series data on the variables of interest for this research were obtained from the annual reports of the CBN spanning the years 1980 to 2017. In order to conduct the inquiry, a model was constructed. The stability of the variables in the inquiry was confirmed at both levels and the first difference, as shown by the results of the Augmented Dickey-Fuller (ADF) stationary test. A significant correlation was observed between the independent variables and total trade when subjected to regression analysis. The results indicate that over an extended period, the exchange rate has a significant beneficial impact on overall commerce, whereas the minimum rediscount rate has a substantial negative influence on total trade. According to the research, the regulation of foreign commerce in Nigeria may be achieved by using monetary policy measures such as controlling the money supply, setting a minimum rediscount rate, and managing the exchange rate. According to the research, to maintain stability in currency rates, it is recommended to reduce the minimum rediscount rate and halt any further depreciation of the naira.

Adeusi, Kolapo, and Aluko (2014) performed research to examine the many factors that influence the profitability of commercial banks in Nigeria. The researchers used the panel data approach to analyze a dataset including both time series and cross-sectional data gathered from 2000 to 2013. The study's sample included fourteen banking institutions. The profitability assessment is carried out by using the metric known as return on assets (ROA), which is subject to the effect of several internal and external variables. The criteria mentioned above and the research findings suggest that several variables, including asset quality, management efficiency, and economic growth, impact commercial banks' profitability. The findings suggest that the variables exhibited statistical significance in terms of their impact on profitability in both the fixed-effect and random-effect models. The empirical analysis demonstrated the considerable importance of asset quality in all examined models, hence leading to the inference that credit risk plays a pivotal role in determining the profitability of commercial banks.

Salloum and Hayek (2012) conducted a study to identify the internal and external variables that impacted the profitability of commercial banks in Lebanon from 2000 to 2010. The empirical results derived from the application of the Generalized Method of Moments (GMM) reveal a consistent level of profitability and provide valuable insights into the influence of internal and external factors on the profitability of banks in Lebanon. These findings shed light on both favorable and unfavorable consequences.

The research done by Babalola (2012) investigated the many elements that impact the financial performance of banks in Nigeria. This research used a combination of macroeconomic, financial, and bank-specific variables to investigate their significant impact on the return on assets. The findings suggest that, in the context of short-term studies, the capital adequacy ratio has a significant role in influencing banks' profitability. Nevertheless, within the realm of enduring alliances, the magnitude and perceptible nature of financial institutions are recognized as the primary factors that impact effectiveness.

Deger and Adem (2011) performed comprehensive research to examine the variables that impact the profitability of banks in Turkey. Their study specifically investigated the influence of both bank-specific factors and macroeconomic factors on bank profitability. The research included the time period from 2002 to 2010. The assessment of bank profitability was carried out by using return on assets (ROA) and return on equity (ROE) while considering both bank-specific elements and macroeconomic determinants. The results obtained from the examination of a balanced panel dataset reveal that there exists a statistically significant positive relationship between the profitability of banks and both their asset size and non-interest revenue. However, it is worth noting that the size of the credit portfolio and the quantity of loans under surveillance have a negative and statistically meaningful impact on the profitability of financial institutions. In the context of macroeconomic circumstances, it is evident that the only determinant with a positive impact on banks' performance is the real interest rate.

Dietrich and Wanzenried (2010) performed an investigation on the profitability of 453 commercial banks operating in Switzerland as part of their research. The research was centered on the time frame, including the years 1999 to 2008. The examination also examined the implications of the ongoing financial crisis. The variables contributing to profitability include bank-specific characteristics, industry-specific components, and macroeconomic influences. The results of this study suggest that there are significant variations in profitability across the banks that were examined in the sample. Furthermore, a significant proportion of this heterogeneity may be attributed to the parameters that were included in the study. The research revealed that the cost-income ratio is a significant factor in determining the return on assets. However, this relationship is only seen prior to the occurrence of a crisis. However, it is essential to note that the impact of loan loss provisions on total loans is considerably more obvious during the crisis period. Moreover, it is evident that during the pre-crisis era, a bank's profitability has a positive impact when its volume exceeds the rate of market expansion. Furthermore, the research findings indicate that banks with a higher percentage of interest income tend to have reduced levels of profitability. However, this link is seen only during the pre-crisis period. Moreover, the deleterious effect of state ownership on bank profitability is no longer discernible during the crisis, and the same observation holds for foreign bank ownership.

Sayilgan and Yildirim (2009) performed research to examine the many variables that impact the return on assets (ROA) and return on equity (ROE) of banks in Turkey over the period spanning from 2002 to 2007. The study conducted by the researchers included the use of monthly data and the aggregate balance sheets of the banks. To examine the relationship between variables, a multi-variable, single-equal regression approach was employed. The results of the regression analysis revealed a statistically significant inverse association between inflation of the consumer price index and the first difference of the ratio of off-balance sheet transactions to total assets, as well as profitability indicators. Furthermore, it is worth noting that there exists a statistically significant positive correlation between the initial differences between the industrial production index, the ratio of budget balance to industrial production index, the ratio of equity to total assets, and several profitability indicators.

Ramlall (2009) did research to examine the many elements that exert an effect on profitability within the banking sector of Taiwan. The research included bank-specific, industry-specific, and macroeconomic factors, using a quarterly dataset covering the period from 2002 to 2007. The study's results suggest that credit risk negatively impacts profitability, while capital has a propensity to improve and strengthen profits. The results suggest that the banking industry in Taiwan exhibits a significant level of diversity. The findings indicate that addressing the issue of banks' profitability pro-cyclicality in Taiwan, particularly in the context of a non-concentrated banking industry, may present some difficulties.

2.6.1. Gap in Literature

Although the DMBs in Nigeria have been affected by social, economic, and financial factors, previous studies have concentrated on bank-specific factors like financial structure, bank size, asset size, and asset structure, among others. However, macroeconomic factors like GDP growth, inflation rate, exchange rate and interest rate, and financial factors such as monetary policy rate, all share index and private sector credit are barely researched into. Therefore, the study examined the effect of the macroeconomic and financial factors that affect the performance of DMBs in Nigeria. Also, while the majority of the previous studies adopted panel regression due to the cross-sections inherent in banks-specific datasets, the present study focusing on macroeconomic and financial determinants adopted non-linear auto-regressive distributed lag due to the time series nature of macroeconomic and financial sector variables used.

3. Methodology

The *ex-post facto* study design was adopted for this study. This research design was adopted because it describes the statistical association between two or more variables using time series data. Therefore, the design permits the testing of the expected effects of macroeconomic and industry-specific financial determinants of DMBs' performance in Nigeria.

3.1. Sources of Data Collection

The objective of the study is to evaluate the macroeconomic and bank-specific financial factors that influence DMBs in Nigeria. The dataset used in this study consisted of secondary data obtained from the publications of the CBN

statistics bulletin and the financial report and annual audited account of banks published in the Nigerian Stock Exchange fact book. The data spanned a period of 22 years, namely from 2000 to 2022. The aforementioned data pertains to several economic indicators in Nigeria, including ROA, GDP, interest and inflation rate, financial sector growth, and stock market development.

3.2. Method of Analysis

pre-estimation tests, estimation tests and post-estimation tests were used to estimate data. The pre-estimation diagnostics tests used in this study included the Phillip-Perron unit root test to assess the stationarity of the data, as well as the NARDL bound test for conducting the co-integration test. The decision to apply the Phillips-Peron (PP) methodology was motivated by the observation that the data-producing process did not conform to an Auto-Regressive (AR) (1) process. Okpanachi, Ezie, and Ropheka (2021) assert that the PP test is a non-parametric method that addresses the presence of autocorrelation and heteroskedasticity in statistical analysis, as suggested by Stock (1994). The development of the Phillips-Perron test was motivated by the need to address the limitations of the Augmented Dickey-Fuller (ADF) test, which presupposes that the residuals are independent and exhibit constant variance.

The estimated approach used in this study was the NARDL, as posited by Shin et al. (2014). The justification for expecting a non-linear relationship between the dependent and independent variables in the study originated from the acknowledgement that economic dynamics, specifically those related to macroeconomic and financial factors impacting the functioning of deposit money institutions, frequently demonstrate non-linear trends. The research used post-estimation tests, including the Breausch-Godfrey serial correlation LM test, the Breausch-Pagan-Godfrey Heteroskedasticity test, and the stability test.

- Model Specification: To ascertain the asymmetric effect of the macroeconomic and bank-specific financial determinants of DMBs on its performance in Nigeria, using Stakeholder's theory, which posits that a bank's performance is not dependent on its level of profitability alone but also other social and economic factors, the study assumed that DMBs return on asset (ROA) is a function of the macroeconomic and financial determinants of DMBs in Nigeria.

Mathematically, this implies that ROA = f (DBP) (1)

Where:
ROA = Return on assets, and
DBP = Determinants of Deposit Banks Performance in Nigeria.

The independent variable, DBP, will be disaggregated into its five (5) main components as follows: GDP, INF, MPR, PSC, which is used as a proxy for financial sector growth and ASI, which is used as a proxy for stock market growth.

Transforming equation 1 into Econometrics form leads to:

$$ROA_t = \alpha_0 + \alpha_1 GDP_t + \alpha_2 INF_t + \alpha_3 MPR_t + \alpha_4 PSC_t + \alpha_5 ASI_t + \mu_t \quad (2)$$

Where:
ROA = Return on Asset (%)
GDP = Gross Domestic Product (N)
INF = Inflation Rate (%)
MPR = Monetary Policy Rate (%)
PSC = Private Sector Credit (N)
ASI = All Share Index (%)
t = Time Trend
α_0, β_0, λ_0 = Intercept or Constant Parameter
μ_t = Error Term or white noise.

Equation (2) is the baseline model for determining the dynamics of macroeconomic and financial determinants of deposit bank performance. To capture the possible asymmetric effect of macroeconomic and financial determinants of deposit bank performance in Nigeria, NARDL technique decomposes the independent variables which are GDP, INF, MPR, PSC and ASI into two parts:
1) partial sum of positive change denoted by GDP^+, INF^+, MPR^+, PSC^+, and ASI^+
2) partial sum of negative change denoted by GDP^-, INF^-, MPR^-, PSC^-, and ASI^- and including both of them as separate regressors in the model, the model becomes:

$$ROA_t = \Phi_0 + \Phi_1 GDP^+ + \Phi_2 INF^+ + \Phi_3 MPR^+ + \Phi_4 PSC^+ + \Phi_5 ASI^+ + \Phi_6 GDP^- + \Phi_7 INF^- + \Phi_8 MPR^- + \Phi_9 PSC^- + \Phi_{10} ASI^- + \mu_t \quad (3)$$

Equation (2) takes the NARDL form of Shin, Yu, and Greenwood-Nimmo (2014) as:

$$ROA_t = \Phi_0 + \Phi_1 GDP^+ + \Phi_2 INF^+ + \Phi_3 MPR^+ + \Phi_4 PSC^+ + \Phi_5 ASI^+ + \Phi_6 GDP^- + \Phi_7 INF^- + \Phi_8 MPR^- + \Phi_9 PSC^- + \Phi_{10} ASI^- + \mu_t \quad (3)$$

Equation (2) takes the NARDL form of Shin, Yu, and Greenwood-Nimmo (2014) as:

$$\Delta ROA_t = u\delta_{t-1} + \sum_{i=1}^{n} \alpha_1 \Delta ROA_{t-1} + \sum_{j=1}^{m} \alpha_2 \Delta GDP_{t-1} + \sum_{j=1}^{m} \alpha_3 \Delta INT_{t-1} + \sum_{j=1}^{m} \alpha_4 \Delta MPR_{t-1} + \sum_{j=1}^{m} \alpha_5 \Delta PSC_{t-1}$$
$$+ \sum_{j=1}^{m} \alpha_6 \Delta ASI_{t-1} + \sum_{k=1}^{o} (\pi_j^+ \Delta GDP^+_{t-j} + \pi_j^+ \Delta INT^+_{t-j} + \pi_j^+ \Delta MPR^+_{t-j} + \pi_j^+ \Delta PSC^+_{t-j} + \pi_j^+ \Delta ASI^+_{t-j} + \pi_j^- \Delta GDP^-_{t-j} + \pi_j^- \Delta INT^-_{t-j}$$
$$+ \pi_j^- \Delta MPR^-_{t-j} \pi_j^- \Delta PSC^-_{t-j} \pi_j^- \Delta ASI^-_{t-j})$$
$$+ \sum_{k=1}^{o} (\pi_K^+ \Delta GDP^+_{t-K} + \pi_K^+ \Delta INT^+_{t-K} + \pi_K^+ \Delta MPR^+_{t-K} + \pi_K^+ \Delta PSC^+_{t-K}$$
$$+ \pi_K^+ \Delta ASI^+_{t-K} + \pi_K^- \Delta GDP^-_{t-K} + \pi_K^- \Delta INT^-_{t-K} + \pi_K^- \Delta MPR^-_{t-K} + \pi_K^- \Delta PSC^-_{t-K}) + \delta ECT_{t-1} + \mu_t \quad (4)$$

$$\Delta ROA_t = \Phi_0 + \Phi_1 ROA_t + \Phi_2 GDP_t^+ + \Phi_3 GDP_t^- + \Phi_4 INT_t^+ + \Phi_5 INT_t^- + \Phi_6 MPR_t^+$$
$$+ \Phi_7 MPR_t^- + \Phi_8 PSC_t^+ + \Phi_9 PSC_t^- + \Phi_{10} ASI_t^+ + \Phi_{11} ASI_t^-$$
$$+ \sum_{i=1}^{n} \gamma \Delta ROA_{t-1} + \sum_{k=1}^{m} (\pi_J^+ \Delta GDP^+_{t-J} + \pi_J^- \Delta GDP^-_{t-J}) + \sum_{k=1}^{n} (\theta_K^+ \Delta INT^+_{t-K} + \theta_K^- \Delta INT^-_{t-K})$$
$$+ \sum_{L=1}^{0} (R_L^+ \Delta MPR^+_{t-L} + R_L^- \Delta MPR^-_{t-L}) + \sum_{m=1}^{p} (S_K^+ \Delta PSC^+_{t-m} + S_m^- \Delta PSC^-_{t-m})$$
$$+ \sum_{n=1}^{q} (T_n^+ \Delta ASI^+_{t-n} + T_n^- \Delta ASI^-_{t-n}) + \mu_t \quad (5)$$

The model defined in this research is based on the ECM given by Inder (1993), with certain modifications to its emphasis.

$$\Delta ROA_t = u\delta_{t-1} + \sum_{i=1}^{n} \gamma \Delta ROA_{t-1} + \sum_{j=1}^{m} (\pi_j^+ \Delta GDP^+_{t-J} + \pi_j^- \Delta GDP^-_{t-J}) + \sum_{k=1}^{n} (\theta_K^+ \Delta INT^+_{t-K} + \theta_K^- \Delta INT^-_{t-K})$$
$$\sum_{i=1}^{o} (\pi_I^+ \Delta MPR^+_{t-I} + \pi_I^- \Delta MPR^-_{t-I}) + \sum_{m=1}^{p} (\theta_m^+ \Delta PSC^+_{t-m} + \theta_m^- \Delta PSC^-_{t-m}) + \sum_{n=1}^{q} (\theta_n^+ \Delta ASI^+_{t-n} + \theta_n^- \Delta ASI^-_{t-n}) + \mu_t$$

The speed of adjustment parameter or coefficient, denoted as "α," represents the rate at which a system adjusts towards its long-run equilibrium. The term "t-1" refers to the lagged Error Correction Term, which is the residual generated from estimating the long-run relationship between variables. The coefficient is anticipated to have a value smaller than one, possess a negative sign, and demonstrate statistical significance. The presence of a negative sign in the ECTt-1 term signifies the long-term convergence of the model towards equilibrium. Additionally, it elucidates the relationship between the magnitude and duration of disequilibrium and the subsequent correction or restoration of equilibrium. In other words, it describes the process by which a disrupted system returns to its equilibrium state.

Nevertheless, the fundamental assumptions for co-integration include the presence of long-term asymmetric factors. The null hypothesis, denoted as H0: φ1 = φ2 = φ3 = φ4 = φ5 = φ6, represents the absence of co-integration. Conversely, the alternative hypothesis, denoted as H1: φ1 = φ2 = φ3 = φ4 = φ5 = φ6, posits the presence of co-integration. Furthermore, the research also used the Wald test to evaluate constraints and determine the significance of asymmetries in both the long run and short run. The null hypothesis for the Wald test is that there are no asymmetries: H_0:φ_1= φ_2= φ_3= φ_4= φ_5 (for the long run) and H_1: $\sum_{j=0}^{m} \pi_J^+ = \sum_{j=0}^{n} \pi_J^- = \sum_{j=0}^{o} \theta_J^+ = \sum_{j=0}^{p} \theta_J^+$ (In the short run, a hypothesis is examined in comparison to the alternative hypothesis of the existence of asymmetries. Similarly, in the long run, another hypothesis is assessed against the alternative hypothesis of the presence of asymmetries- H_1:φ_1= φ_2= φ_3= φ_4= φ_5 (for the long run) and H_1: $\sum_{j=0}^{m} \pi_J^+ = \sum_{j=0}^{n} \pi_J^- = \sum_{j=0}^{o} \theta_J^+ = \sum_{j=0}^{p} \theta_J^+$.

The first phase of this study included using descriptive statistics to analyze the dataset, specifically focusing on calculating the mean, standard deviations, and auto-correlation features. Subsequently, an examination of the study variables' trends is conducted before doing the Unit Root test to determine the stationarity characteristics of the series. The NARDL model is then implemented, along with the presentation of pre-estimation test results. The findings of the descriptive statistics are shown in table 1.

Description of Variables:

- The ROA is largely used as a metric to assess profitability. The presentation of this metric involves the division of the bank's net income by its total assets.
- The GDP is often regarded as the primary measure of a nation's economic expansion. This metric serves as an indicator of the overall degree of productivity within an economy.
- Inflation, denoted as INF, is a metric that quantifies the pace at which the overall price level of goods and services experiences upward movement while concurrently diminishing the buying power associated with them. The concept in question pertains to the evaluation of macroeconomic stability.
- The Monetary Policy Rate refers to the fundamental interest rate inside an economy. All other interest rates within an economy are derived from it.
- Private sector credit refers to the aggregate value of loans, advances, acquisitions of non-equity securities, trade credits, and other account receivables extended by the financial sector of Nigeria to the private sector on an annual basis.
- The term "All Share Index" pertains to an index representing the aggregate value of equities traded by all publicly listed companies on the NSE during a given year.

4. Results and Discussion

The findings of this investigation were systematically presented in a series of steps. The display of descriptive statistics provides a foundation for analyzing key characteristics of the dataset, such as the mean, standard deviations, and auto-correlation qualities. The researchers proceeded to undertake the Unit Root test to determine the series' stationarity qualities. Subsequently, the NARDL model and the outcomes of the post-estimation tests were presented. The findings of the descriptive statistics are shown in table 1.

Variable	Mean	Std. Dev.	Skewness	Kurtosis	JarqueBera	Probability	Obs
ROA	328411.6	251.699	-0.625100	3.425274	6.775343	0.0338	45
GDP	309735.7	330.184	0.8053231	3.047490	3.179783	0.9140	45
INT	260513.4	140,290	-0.663290	4.563416	9.073568	0.0107	45
MPR	314911.6	127.391	-0.633102	3.425274	5.775343	0.0138	45
PSC	331833.1	330.184	0.3053231	3.047490	4.179783	0.8453	45
ASI	334213.3	140,290	-0.663290	4.563416	9.073568	0.0347	45

Table 1: Summary of Descriptive Statistics of the Study Variables
Source: Extract From Results of E-Views 10

Statistics presented in table 1 on the summary description of the variables used in the paper were used to test for normality properties of residuals in the data set. To achieve this purpose, the paper compared skewness values with the standard value of Skewness of a symmetric distribution, such as normal distribution, which is zero. Results reveal that The Kurtosis of a distribution, which measures the peakness of the distribution that is assumed to be normal, is 3. In table 1, the series values were all close to 3. Thus, the series does not exhibit the characteristics of a distribution with a high peak and flat tails called leptokurtic (k>3). They do not also have substantially flat-topped curves and thinner tails called platykurtic (k<3), but they have generally exhibited mesokurtosis (k=3), suggesting a normal distribution. Jarque–Bera's results show that the series failed to reject the null hypothesis of a normal distribution. It is, therefore, clear that the series is subject to distribution that is not different from the normal one. The paper proceeds to inspect the trend of the variables used.

4.1. Unit Root Test Result

The purpose of doing a unit root test using the Phillips Perron (PP) approach was to assess the trend and direction of a series and to guarantee that the data for the variables included in the model do not exhibit unnecessary fluctuations. Table 2 displays the results of the unit root testing.

Variable	PP Test Statistics	Critical Values	Order of Integration
ROA	-1.694171**	-2.928142	I(1)
GDP	-0.167481**	-2.928142	I(1)
INF	0.580563*	-2.928142	I(0)
MPR	-1.637124**	-2.928142	I(1)
PSC	0.390855*	-2.928142	I(0)
ASI	-0.11661**	-2.928142	I(1)

Note: The tests include intercept and trend; ** significant at 1%; ** significant at 5%*

Table 2: Summary of Unit Root Test Results
Source: Authors Computation 2022 (E Views-10)

According to the findings shown in table 2, the results of the Phillips-Perron (PP) test reveal that four variables, namely ROA, GDP, MPR, and ASI, were determined to be non-stationary at both levels and at a significance level of 5%. Initially, they remained still at the outset of the disparity. Therefore, the unit-roots PP test for the variables was deemed acceptable at the specified levels for the four variables under consideration. Two variables, INF and PSC, were determined to be stationary at the level of significance of 5 percent. Therefore, it was determined that the variables exhibit mixed-order integration, which meets the requirement for using the asymmetric limits technique to conduct a co-integration test.

4.1.1. Asymmetry Test

The asymmetry test was used in this research to examine the long-run and short-run asymmetric characteristics of the variables being analyzed. The null hypothesis posits that there is no significant decomposition of the study variables into partial sums of positive and negative changes in GDP, INF, MPR, PSC, and ASI, indicating the absence of asymmetries. Conversely, the alternative hypothesis suggests that there is a significant decomposition of the changes, indicating the presence of asymmetries.

	Wald Statistic		Evidence of Asymmetry	
Variables	Long-run	Short run	Long-run	Short-run
ROA	7.554491	5.25422	Yes	Yes
	(0.0060)*	(0.0011)**		
GDP	12.70954	9.591129	Yes	Yes
	(0.0000)*	(0.0000)*		
INF	11.65101	9.086425	Yes	Yes
	(0.0000)*	(0.0000)*		
MPR	8.46186	9.011049	Yes	Yes
	(0.0052)*	(0.0000)*		
PSC	14.2494	10.836411	Yes	Yes
	(0.0000)*	(0.0000)*		
ASI	12.33147	6.934420	Yes	Yes
	(0.0000)*	(0.0035)*		

Table 3: Result of the Asymmetry Wald Test
Source: Authors Computation 2022 (E Views-10)
*Note: The Test Include Intercept and Trend; * Significant at 1%; ** Significant at 5%*

The findings of the Wald test, as shown in table 3, indicate that the null hypotheses, which posit the absence of asymmetry in the short and long-run coefficients for all variables, are rejected. The obtained outcome further supports the validity of the NARDL model used in this study.

4.1.2. Co-integration Test Result

The findings of the co-integration Bounds test are shown in table 4.

F-Bounds Test	Null Hypothesis: No Levels Relationship			
Test Statistic	Value	Signif.	I(0)	I(1)
F—statistic	17.85318	10%	4.16	5.33
K	4	5%	4.59	5.18
		1%	5.6	6.20

Table 4: Summary of Co-Integration
Source: Authors Computation 2022 (E Views-10)

The results of the limits test, as shown in table 4, indicate that the F statistic value of 17.85318 surpasses both the upper bound of 5.18 and the lower bound of 4.59 at a significance level of 5%. This implies the presence of a sustained relationship between the variables. This discovery suggests rejecting the null hypothesis, which posits the absence of co-integration among the variables. Hence, it may be inferred that an uneven long-term relationship exists between macroeconomic and financial dynamics, namely in their capacity as catalysts for DMBs in Nigeria.

NARDL-ECM				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA(-1)	0.391044	0.446040	3.919143	0.0007
GDP_POS (-1)	0.229233	0.304260	6.627638	0.0397
GDP_NEG(-1)	-7.706718	7.812369	-3.713833	0.0849
INF_POS(-1)	-2.637604	9.114771	-3.847010	0.1281
INF_NEG(-1)	-2.928012	8.205100	-1.412367	0.0925
MPR_POS(-1)	-9.524543	0.120963	-9.105590	0.0108
MPR_NEG(-1)	-8.825281	1.061058	-7.502461	0.0203
PSC_POS(-1)	-11.71515	0.041042	-8.673005	0.0275
PSC_NEG(-1)	-9.209504	0.138905	6.395394	0.0321
ASI_POS(-1)	10.30276	1.409320	9.613003	0.0351
ASI_NEG(-1)	8.138025	0.370191	7.706021	0.0482
CointEq(-1)	-0.341129	0.409280	-8.130140	0.0000

Table 5: NARDL_ECM Regression Result
Source: Authors Computation 2022 (E Views-10)

Table 5 presents empirical evidence indicating that the lagged error correction model fulfills three key criteria: negativity, statistical significance, and a value below unity. The speed of adjustment was, however, moderate as a shock in the system will return it to equilibrium at an average speed of 34.1%.

4.1.3. Robustness Test Results

Robustness tests conducted in this study were Breusch-Godfrey-Serial-Correlation Test, Heteroscedasticity-ARCH Test, Normality test and CUSUM test for stability of residuals.

Test		Outcomes	
		Coefficient	Probability
Breusch-Godfrey-Serial-Correlation Test	F-stat.	0.515819	0.6047
Breusch-Pagan-Godfrey Heteroscedasticity Test	F-stat.	0.644538	0.8262
Normality test	Jarque-Bera	3.359363	0.1893

Table 6: Robustness (Test) Result
Source: Extract Form E-Views

The post-estimation test of the NARDL model, as shown in table 6, indicated that there was no significant evidence of serial correlation and heteroscedasticity in the estimated model. This conclusion is supported by the p-values of both variables (0.6047 and 0.8262), which were determined to be larger than the threshold of 0.05. Furthermore, the normality test, as shown in table 6, indicates that the Jarque-Bera test yielded a result of 3.359363 with a probability value of 0.1893, suggesting that normality has been achieved at a significance level of 5%.

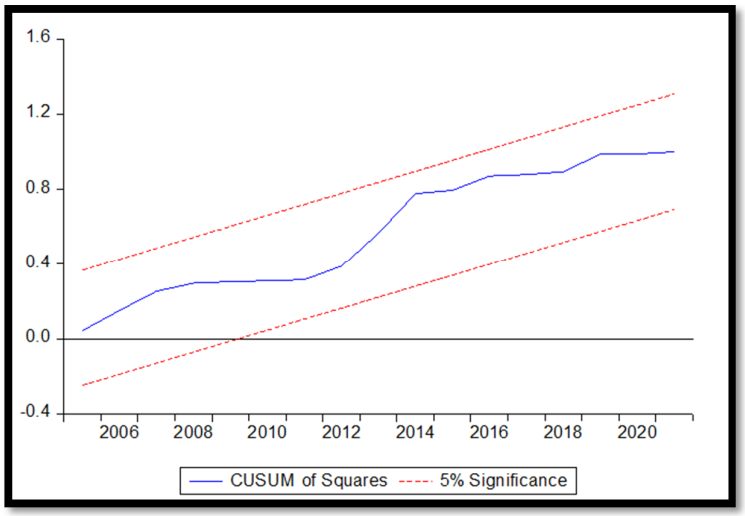

Figure 1: CUSUMsq Stability Test

The findings from the analysis of CUSUMsq, as shown in figure 1, suggest that the model exhibits stability and that the regression equation is well described. This conclusion is supported by the observation that the chart plot falls inside the critical boundaries at a significance level of 5%. Therefore, the concept of stability remains unchallenged.

5. Discussion of Findings

The impetus for this paper was to assess the asymmetric macroeconomic and industry-related financial determinants of DMBs' performance in Nigeria. The results of the paper showed that GDP is a long-run negative asymmetric determinant of DMB performance and a corresponding positive asymmetric determinant of DMB performance in Nigeria. This indicates that as a long-run negative determinant of DMB performance, GDP is also a corresponding positive determinant of DMB performance in Nigeria. Thus, as GDP decreases, the performance of DMBs decreases. This negative effect was not significant at 5% level, while the corresponding positive effect was significant at 5% level. This means GDP is a positive determinant of DMBs' performance in Nigeria. This conclusion is consistent with the study done by Salloum and Hayek (2012), which showed that the profitability of banks operating in Lebanon is influenced by both internal and external variables, such as GDP, in either a positive or negative manner.

The study also discovered that INF is a long-term joint negative asymmetric factor influencing the performance of DMBs in Nigeria. Therefore, inflation has a detrimental impact on the performance of DMBs in Nigeria. However, this finding is not statistically significant at the 1% level. This implies that the attempts to manage inflation for optimal economic outcomes in Nigeria have shown to be ineffective, especially in relation to the performance of DMBs. This study aligns with the research conducted by Salloum and Hayek (2012), which shows that the profitability of banks operating in Lebanon may be influenced either favorably or adversely by both internal and external variables, such as inflation.

In a similar vein, the study discovered that the Monetary Policy Rate (MPR) serves as a long-term, jointly negative and asymmetric driver of DMB performance in Nigeria. Therefore, it can be concluded that the monetary policy rate has a detrimental impact on the performance of DMBs in Nigeria. The obtained result demonstrates statistical significance at a significance level of 1%. This implies that the monetary policy stance (MPS) has a role in contributing to the adverse impact of inflation on the profitability of DMBs. This observation aligns with the findings of Okpanachi, Ezie, and Ropheka (2021), whose research demonstrated that an increase in long-term monetary policy rates had a substantial adverse impact on Nigeria's foreign trade.

Similarly, the study discovered that Political Stability and Control (PSC) is a long-term, mutually negative and asymmetric factor that influences the performance of DMBs in Nigeria. This finding suggests that the performance of DMBs in Nigeria is adversely affected by private-sector loans. The obtained result demonstrates statistical significance at a significance level of 1%. This implies that the underperformance of the financial sector in terms of supplying financial resources to the private sector has had a detrimental impact on the performance of DMBs in Nigeria. This discovery presents a contrasting perspective to the research conducted by Ramlall (2009), which indicated that credit risk has a detrimental effect on profitability, whereas capital allocation to the private sector tends to enhance profit consolidation.

The findings of the study indicate that the Asset Size Index (ASI) has a long-term negative asymmetric impact on the performance of DMBs in Nigeria. Additionally, the study reveals that there are matching positive asymmetric factors that influence the performance of DMBs in the country. This finding demonstrates that the long-term impact of ASI on DMB performance in Nigeria is both detrimental and good, serving as a factor in both directions. Therefore, when the availability of ASI diminishes, the efficiency of Decentralized Multi-Agent System also declines. Both negative determinants were found to be statistically significant at a significance level of 5%. This implies that the ASI has a favorable influence on the performance of DMBs in Nigeria, indicating that the Nigerian stock market has had improved growth throughout the time under investigation. This conclusion is consistent with the study undertaken by Adeusi, Kolapo, and Aluko (2014), which also demonstrated a statistically significant relationship between private-sector loans and profitability.

6. Conclusion and Policy Recommendations

The banking sector operates in an economic, social and political environment, which is bound to influence its performance. Therefore, the influence of the macroeconomic and financial environment on the performance of DMBs in Nigeria is evident. Thus, while gross domestic product and all share index of the capital market are positive determinants of DMBs in Nigeria, inflation, monetary policy rate and private sector credit are negative determinants of DMBs in Nigeria. However, while all share indexes have a positive influence on the performance of DMBs in Nigeria, the positive influence of GDP is not significant. Nevertheless, the negative influence of inflation, monetary policy rate and private sector credit remained negative throughout the study period. In view of these findings, the following recommendations are made:

- Since GDP growth is a positive determinant of DMB performance in Nigeria, the Federal Government should be committed to implementing economic policies aimed at accelerating rapid economic growth for the enhanced performance of DMBs in Nigeria. As a positive determinant of DMB performance, the influence of GDP on the performance of DMBs in Nigeria is still not significant. Thus, more efforts are needed by policymakers and economic managers to accelerate economic growth to a level that could contribute significantly to the performance of DMBs in the study area.
- Based on the finding that the monetary policy rate is not a significant determinant of DMBs' performance in Nigeria, the Central Bank of Nigeria should be more dynamic and strategic with the monetary policy rate (MPR) to ensure an efficient interest rate charged by DMBs. In fact, a comprehensive review of the MPR is needed to ensure a positive and significant impact on the performance of DMBs in Nigeria.

- Given the finding that inflation is a negative, significant determinant of DMB performance in Nigeria, the CBN should consider DMB indicators while performing its monetary policies aimed at reducing inflation rates in Nigeria. Similarly, the Federal Government should constantly assess DMB performance while performing its fiscal policy role to ensure that its economic regulatory function is in rhythm with DMB performance.
- Since the private sector is not a significant determinant of DMB performance in Nigeria, the financial sector, especially DMBs, the CBN, microfinance banks and the capital market should work together to ensure that adequate financial resources are provided to the private through financial intermediation, in line with the dynamics surrounding DMBs in Nigeria

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