The Effect of Financial Deepening and Borrowing Cost on Aggregate Output in Nigeria and its Policy Implications

ABSTRACT

This study examines the effect of financial deepening and borrowing costs on aggregate output using secondary data from 1986 to 2022. The effect of financial deepening and borrowing costs on aggregate output is expressed in an autoregressive distributed lag (ARDL) model. The findings of the study indicate that the state of financial deepening in Nigeria is not sufficient to drive production to optimal levels, indicating that there are unrealized gains in the business of providing financial intermediation services in the economy. The result of the estimated models shows among other things that aggregate output is inelastic to changes in lending rate, indicating that raising policy interest rate will lead to minimal losses in output. It also shows that financial deepening has the potential to contribute significantly to output growth. It is concluded that financial deepening in the short run may not be achieved by relying totally on market equilibrium where it is expected that the market for credit and other financial services will clear and produce optimal macroeconomic outcomes. Rather, policies (reforms) should be made to heighten the demand and supply of credit in the economy to support real sector production activities.

1.0 INTRODUCTION

Over the years, research in Economics has shown that finance drives economic progress. Theories such as the Finance-led growth hypothesis and other theories have added credence to the role of finance in economic activities (Ajisafe and Okunade, 2020). Consequently, increasing access to finance has been seen as an important way of improving macroeconomic outcomes

globally. Financial deepening should increase demand and supply of financial services, leading to financial sector efficiency and real sector growth.

The major aspect of financial deepening in an economy is increase in lending and borrowing. On the demand side, the ability of firms and individuals to borrow is determined by several factors particularly the cost of funds in the credit market. On the supply side, the decision of credit-creating institutions to lend and how much to lend depends on the returns from lending and the repayment capacity of the borrowers. Competition among credit-creating firms should increase financial sector efficiency, and increase access to credit at a reduced cost and thus enhance the flow of financial capital for productive investment.

A snapshot of global trends shows that between 1986 to 2022, credit to the private sector as a percentage of GDP which is one of the popular measures of financial deepening for many emerging and developed economies such as Malaysia, Singapore, the USA, the UK, Japan, and Canada averaged over 100 percent, indicating that the size of credit in these Economies are higher than the monetary value of aggregate output whereas in many less developed Economies such as Nigeria, Angola, Botswana and Benin the average is less than 30%(WDI, 2023). The cost of borrowing in developed and emerging economies is also lower than that of less developed economies. Although this global trend may require further empirical evidence to reach reliable conclusions about the impact of financial deepening on macroeconomic outcomes, it suggests that financial deepening may be associated with desirable macroeconomic outcomes.

Nigeria's financial sector has witnessed several reforms aimed at deepening financial services. These include but are not limited to the deregulation of the financial sector following the structural adjustment program, relaxing the conditions for licensing banks for more commercial banks to emerge, the establishment of the Nigerian Deposit Insurance Cooperation (NDIC) to insure bank deposits, introduction of uniform accounting standards for banks, increase capital requirement for the establishment of new banks and other reforms. In the capital market, the Security and Exchange Commission (SEC) was established to regulate the capital market. There have also been reforms in the foreign exchange market and changes in monetary policy strategy (Omankhanlen, 2012). However, among the observable features of the Nigerian financial sector

is the high lending interest rate which is known in economic analysis to impart negatively on aggregate output.

Financial deepening has significant implications for the transmission of monetary policy. The effectiveness of monetary policy transmission relies on the depth and efficiency of the financial system (Effiong, Esu, and Chuku,2017). In most cases, the policy response to the persistent inflation and exchange depreciation in Nigeria is usually to increase the monetary policy rate. This policy is usually intended to reduce excess liquidity in the economy and to attract the flow of international capital which can have an appreciating effect on the exchange rate and also reduces inflation because of the pass-through effect of the exchange rate on inflation.

However, the appropriateness of this policy has been brought into question because of the expected negative effect that the resulting high borrowing costs can have on aggregate output.Given the importance of financial deepening in driving growth, reducing borrowing costs, and the effectiveness of monetary policy, it is appropriate to consider the role of financial deepening in solving this policy dilemma. Consequently, this study investigates the effect of financial deepening and lending rates on output and the policy implications.Specifically, to examine the appropriateness and effectiveness of changes in policy interest rates in Nigeria.

The rest of the paper is organized as follows; section two is the literature review, section three contains the methodology of the study, section four presents the empirical result and discussion, and section five states the conclusions and recommendations of the study.

2.0 Literature Review
2.1Theoretical Literature
The theory of financial deepening explains the connection between the expansion of financial marketsand economic growth, suggesting that the provision of financial resources by the financial sector to the real economy stimulates economic development. This hypothesis is often referred to as the **finance-led growth theory** or **the supply-leading hypothesis** and traces its origins back to the seminal work of Schumpeter (1911). Schumpeter argued that the services of financial intermediaries such as mobilizing savings, providing loans, evaluating projects, managing risk, and facilitating transactions, are crucial for fostering technological innovation

and economic progress. This perspective finds support in the works of Shaw (1973), McKinnon (1973), King and Levine (1993), and Calderon and Lui (2003).According to the supply-leading hypothesis, there exists a causal relationship between financial development and economic growth, with finance driving growth without feedback effects. McKinnon (1973) and Shaw (1973) further highlight the issue of **financial repression**, whereby government regulations impede the efficient functioning of financial intermediaries. Financial liberalization advocated as a solution to financial repression, aims to promote domestic savings, investment, and efficient capital allocation by deregulating the financial sector (Graham, 1996).However, experiences with financial liberalization have been mixed, with successes and crises observed in developing economies(Vos, 1993; Montiel, 1995).

The **Keynesian IS-LM model** is a fundamental framework in macroeconomics used to analyze the equilibrium level of output and interest rates in an economy. The model combines the goods market (IS) and the money market (LM) to determine the equilibrium level of income and interest rates, respectively (Hicks, 1937). The IS curve represents equilibrium in the goods market and shows the combinations of output (Y) and the interest rate (r) at which aggregate expenditure equals output. In the IS-LM model, the IS curve represents equilibrium in the goods market, showing the combinations of output and interest rates where aggregate demand equals aggregate supply. The IS curve is downward-sloping, indicating an inverse relationship between output and the interest rate. On the other hand, the LM curve represents equilibrium in the money market, showing the combinations of income and interest rates where money demand equals money supply. The LM curve is upward-sloping, indicating a positive relationship between income and the interest rate. The intersection of the IS and LM curves determines the equilibrium level of output (Y) and the interest rate (r) (Blanchard, 2017).

Changes in fiscal or monetary policy shift the IS and LM curves, leading to changes in output and interest rates.The effectiveness of fiscal and monetary policy within this model depends on the relative sensitivities of these markets to changes in interest rates. Monetary policy, typically executed through changes in the money supply, affects the LM curve by shifting it rightward (expansionary policy) or leftward (contractionary policy). The relative sensitivities of the goods

and money markets to changes in interest ratesare reflected in the slopes of the IS and LM curves (Mankiw, 2019).

Thus, the effectiveness of monetary policy in an economy can be analyzed using the slopes of the IS and LM curves. If the LM curve is relatively flat, implying a highly interest-elastic demand for money, monetary policy becomes highly effective. Small changes in the money supply can lead to significant changes in income and output. Conversely, if the IS curve is very steep, indicating low interest elasticity of investment, monetary policy has limited effectiveness because changes in interest rates have a minimal impact on investment and aggregate demand. This scenario is often described as the liquidity trap, where monetary policy loses its efficacy, as observed in the context of the Great Depression and more recently in Japan's deflationary period (Krugman, 1998).

Moreover, the effectiveness of monetary policy in the IS-LM model also depends on the expectations and behaviors of economic agents. **Rational expectations** and forward-looking behavior can diminish the impact of monetary interventions. If agents anticipate monetary expansions and adjust their behavior accordingly, the anticipated inflation may neutralize the effects of increased money supply on real interest rates and output (Lucas, 1972). Additionally, central bank credibility plays a crucial role; if the public doubts the central bank's commitment to controlling inflation, the effectiveness of monetary policy can be undermined. Thus, while the IS-LM model provides a structured way to analyze the mechanisms of monetary policy, its real-world applicability requires considering the dynamic and often complex responses of economic agents and institutional factors (Romer, 2012).

2.2 Empirical Literature
2.2.1 Financial Deepening and Aggregate Output

Bhattarai (2013) examined the effects of financial deepening on economic growth in Germany, France, and the UK using a Dynamic Computable General Equilibrium (DCGE) model and data that spans from 2007 to 2011.The study shows that the actual financial deepening ratio observed exceeded the optimal financial deepening ratios implied by the DCGE model. The study also reveals that fluctuations in financial deepening ratios triggered macroeconomic volatilities. This

study underscores the sensitivity of macroeconomic stability to financial sector developments in advanced economies.

Ayinde and Yinusa (2016) conducted a threshold analysis of the relationship between financial development and inclusive growth, spanning data from 1980 to 2013. They used quantile regression and the Granger causality test, considering both financial deepening and widening indicators. Their findings indicated that the impact of financial development on inclusive growth is contingent on the measure of financial development up to a threshold level, with financial deepening negatively affecting inclusive growth, whereas financial widening had a positive impact.

Imoughele and Ismaila (2014) examined the relationship between commercial bank credit and economic growth in Nigeria from 1986 to 2012. Employing the co-integration and error correction model, the study found a positive long-term relationship between commercial bank credit and economic growth. The authors recommended policies aimed at increasing credit accessibility to boost economic growth. In a different context, Ogbuagu and Ewubare (2017) explored the Nigerian economy, employing an error correction model and causality tests to investigate the interplay between financial deepening, macroeconomic volatility, and economic growth. Their research utilized indicators such as the ratio of money supply to GDP, private sector credit to GDP, stock market capitalization to GDP, and the volume of stock traded to GDP. They discovered a long-run impact between financial deepening on exchange rate volatility and economic growth. Using the ARDL bond testing approach and data spanning from 1981 to 2016, Ehigiamusoe and Lean (2019) also found that both financial deepening and bank lending positively impact economic growth in the long run.

Bassey and Effiong (2020) also focused on Nigeria, utilizing data from 1981 to 2018. They employed the ARDL bond test for cointegration, an Error Correction Model (ECM), and a Granger Causality test, using credit to the private sector as a ratio to GDP as their measure of financial deepening. Their findings indicated that financial deepening promotes economic growth and identified a long-term relationship between these variables. Similarly, Onyeoma and Oligbi (2020) assessed the effect of financial sector development and financial deepening on economic growth in Nigeria using the ARDL model. Their study included variables like the volume of money market instruments, market capitalization to GDP ratio, savings to GDP ratio, insurance

income, and private sector credit to GDP ratio. The results demonstrated a positive impact of both financial development and the deepening on economic growth.

In a comprehensive study, Akintola, Oji-Okoro, and Itodo (2020) examined the contributions of the money, capital, and foreign exchange markets to economic growth in Nigeria using ARDL estimation on quarterly data from 2000 to 2019. Their results highlighted the positive effects of financial deepening, banking system liquidity, and the all-share index on output growth in the long run. Ajisafe and Okunade (2020) tested the finance-led growth hypothesis in Nigeria using data from 1986 to 2017, employing the ARDL model and VECM causality test. Their study confirmed that financial development and investment significantly influence economic growth, with a unidirectional causality from financial development to economic growth, supporting the finance-led growth hypothesis.

Chinwe (2022) utilized ordinary least squares regression (OLS) to study the relationship between financial development and economic growth using data from 1986 to 2020. The study found that broad money supply as a percentage of GDP and private sector credit as a percentage of GDP positively and significantly affected economic growth, while stock market capitalization and insurance premiums to GDP had a negative effect. Ogbaro et al. (2023) also examined the role of financial development in the relationship between remittances and economic growth in Nigeria, analyzing data from 1981 to 2021 using fully modified OLS regression. They concluded that financial development is a prerequisite for remittances to significantly impact economic growth, highlighting a critical interaction between remittances and financial sector development.

The review of empirical studies shows that some scholars have differentiated between financial development and financial deepening. The review shows that the difference between these two concepts is a matter of scope. While financial deepening is an aspect of financial development, financial development includes broader measures of financial system efficiency and stability. Key measures of financial deepening used in these studies are broad money supply to GDP ratio, private sector credit to GDP ratio, and stock market capitalization to GDP ratio. Most studies on the impact of financial sector development on the economy used additional indicators such as banking sector liquidity, insurance premium to GDP, and other indicators that measure efficiency and stability while few studies used the core financial deepening indicators as a proxy for financial sector development.

While diverse in their approaches and contexts, these studies collectively elucidate the roles of financial deepening and development in fostering economic growth. They highlight the importance of country-specific dynamics and the varying impacts of different financial indicators, providing a robust understanding of how financial sector policies can be tailored to support sustainable economic progress. Financial deepening measures both the size and spread(inclusion) of credit and other financial services in the economy. Thus, in this study, we treat financial inclusion as one of the measures of financial deepening along with other measures of financial deepening in the economy.

2.2.2 Borrowing Cost and Aggregate Output

The relationship between borrowing costs and aggregate output remains a crucial area of research, particularly in the wake of recent shifts in global monetary policies.

Mojon and Smets (2015) analyze the impact of low borrowing costs in the Eurozone following the European Central Bank's unconventional monetary policies. Using a dynamic stochastic general equilibrium (DSGE) model, they find that lower borrowing costs significantly boost aggregate output by encouraging investment and consumption. The study underscores the effectiveness of monetary easing in stimulating economic activity in a low-interest-rate environment. Similarly study by Delis, Hasan, and Mylonidis (2017) on the Eurozone shows that lower borrowing costs lead to higher output and profitability, particularly for small and medium-sized enterprises (SMEs) while Aghion et al. (2019) explore the impact of borrowing costs on innovation and productivity growth in OECD countries also found that lower borrowing costs stimulate innovative activities, leading to higher aggregate output.

Sastry (2018) study focuses on the Indian economy, examining how changes in borrowing costs affect aggregate output. Using a structural VAR model, the study finds that reductions in borrowing costs lead to significant increases in aggregate output, primarily through enhanced private-sector investment. The findings suggest that lower borrowing costs are crucial for sustaining economic growth in emerging markets. Studies about other emerging market economies such as López-Villavicencio and Mignon (2020) which investigated the non-linear effects of borrowing costs on aggregate output in emerging markets using a threshold model, found that the relationship between borrowing costs and output growth is negative. However, the study shows that the level of impact depends on the level of financial development. In more

financially developed markets, lower borrowing costs significantly enhance output, while the effect is less pronounced in less developed financial markets.

Beck et al. (2020) analyze the impact of borrowing costs on SMEs across different countries. Using cross-country firm-level data, the authors find that lower borrowing costs lead to higher output growth for SMEs, particularly in developing economies. The results suggest that reducing borrowing costs can help bridge the productivity gap between SMEs and larger firms, enhancing overall economic output

In Nigeria,Okoye and Eze (2013) investigated the relationship between interest rates and economic growth from 1980 to 2010. Using OLS regression analysis, they concluded that high interest rates were detrimental to economic growth, as they discouraged borrowing and investment. Ademola and Arogundade (2014) also analyzed the impact of financial sector development and interest rates on Nigeria's economic performance from 1980 to 2012. Their findings indicated that while financial deepening contributed positively to economic growth, high interest rates impeded the growth of aggregate output.

Adeniyi et al. (2015) analyzed the effect of interest rates on economic growth in Nigeria using annual data from 1981 to 2012. The study employed the Autoregressive Distributed Lag (ARDL) model and found that high interest rates negatively impacted economic growth, indicating that lower borrowing costs could stimulate economic activity.Nwaogwugwu et al. (2021) also applied the ARDL technique to a data set that spans from 1990 to 2020 and found that higher interest rates lead to reduced investment across various sectors, which in turn slows GDP growth while Adebayo and Akinsola (2023) applied Cointegration and Error Correction Modeling (ECM) techniques to analyzed the long-term relationship between borrowing costs and GDP growth in Nigeria using time-series data from 1980 to 2022 and concluded that sustained high borrowing costs have a detrimental effect on long-term economic growth.

The empirical studies reviewed consistently demonstrate that borrowing costs play a crucial role in influencing aggregate output. Lower borrowing costs generally lead to higher production by stimulating investment, innovation, and consumption. However, the long-term effects of sustained low borrowing costs, potential financial imbalances, and the heterogeneity in impacts across different economic contexts are important considerations for policymakers. Effective

management of borrowing costs, through both monetary and fiscal policies, is essential for sustaining economic growth and stability.

3.0 METHODOLOGY

The study adopts an econometrics methodology to estimate the effect of financial deepening and lending rates on output in the Nigerian economy. The data sample used for the study spans from 1986 to 2022 and was sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin. It could be recalled that significant reforms in Nigeria's financial sector started in 1986.

3.1 Model Specification

To model the effect of financial deepening and borrowing cost on output, we start with the simple Solow growth model where output depends on capital(K) and labor(L) (Solow, 1956)

$$Y = F(K\ L) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.1$$

Capital stock(K) in the economy is determined by savings(s), change in capital stock (CS), interest rate(R), the size of credit(c), money supply (M), the general price level(P), the spread of credit (financial inclusion) (FI) most of which are financial deepening indicators and other factors(E).

$$K = F(S\ CS,\ R,\ C,\ M,\ P,\ FI,\ E) \dots\dots\dots\dots\dots\dots\dots..2$$

Substituting Equation 2 into 1

$$Y = F(S,\ CS,\ R,\ C,\ M,\ P,\ FI,\ L,\ E) \dots\dots\dots\dots\dots..............3$$

Savings and credits are components of broad money supply in an economy, hence there is high potential for multicollinearity among the three variables. However, money supply includes a wide range of components whereas credits are monies extended directly to firms by financial institutions in the economy. Thus, credit is a better measure that can be used to examine the effect of financial deepening on aggregate productivity. Hence, the model for this study is stated as follows;

$$Y = F(R,\ C,\ CS\ P,\ FI,\ L,\ E)\dots\dots\dots\dots\dots\dots\dots.....4$$

Based on equation 4, the model for this study is stated as follows;

$$GDPG = F(LIR,\ RCPS,\ INF,\ FIN,\ CKS,\ LFP) \dots\dots\dots.5$$

$$LOG(GDPG) = \beta o + \beta 1 LIR + \beta 2 LOG(RCPS) + \beta 3 LOG(FIN) + \beta 4 CKS + \beta 5 INF + \beta 6\ LFP + Ut\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.6$$

Where

GDPG = Real GDP (in N' Billions)

LIR= Average of maximum and prime Lending Interest Rate (%)

RCPS= Credit to the private sector (in N' Billions)

FIN= Financial Inclusion Index (number of bank branches per capita divided by total branches)

CKS= Change in capital stock (growth in gross fixed capital formation (%))

INF= The general price level (Inflation Rate (%))

LFP= Labor Force Participation rate

Ut= error term

$\beta 0$ to $\beta 5$ are parameters of the model

The number of bank branches per capita is used to construct financial inclusion index because data on bank branches in Nigeria every year is consistently available throughout the period of this study (1986-2022). Data on the number of people with bank accounts are only available in recent years with inconsistency. Also, Technologies such as Automated Teller Machine (ATM), Point of Sale (POS), mobile money and other kinds of financial technologies which has enhance financial inclusion are relatively recent developments in the payment system.

Apriori expectation

$\beta 1 < 0$; $\beta 2 > 0$; $\beta 3 < 0$; $\beta 4 > 0$; $\beta 5 > 0$; $\beta 6 > 0$

Log transformation was done for all variables not measured in percentages to eliminate outliers and to be able to interpret the coefficient as percentage changes.

Estimation Procedures

Autoregressive Distributed Lag (ARDL) Model: Following the ADF unit root test is the estimation of an autoregressive distributed lag model. Here, the dependent variable is expressed as a function of the lag value of the dependent variable and the current and lag values of the explanatory variables. This estimation technique is adopted because it can be applied even when variables are not integrated in the same order as in the case of this study and both the long-run and short-run relationships can be explained using this procedure. It also takes into consideration the effect of lags which is frequently observed in economic behaviour. The general form of the ADRL model is expressed as follows;

$$Y_t = \beta_0 + \beta_1 \sum_{k=i}^{p} Y_{t-i} + \beta_2 X_t + \beta_3 \sum_{k=i}^{q} X_{t-i} + Ut \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 8$$

Where

β_o= constant term

Y_t =the dependent variable

Y_{t-i}= lags of the dependent variable

X_{ti}= the row vector of the explanatory variables of the model

X_{t-I} = the row vector of the lags of the explanatory variables of the model

$\beta_{1i}, \beta_{2i}, \beta_{3i}$ = the model coefficients

Ut= error term

ARDL Bond Test for Cointegration: To examine the long relationship among variables, the ARDL bond test for cointegration is applied. The bond test is a diagnostic test within the ARDL framework that helps determine whether the model should be estimated using a level relationship, a first-difference relationship, or a combination of both.

Following equation 8, the general form of the bond test process is given as;

$$\Delta Y_t = \beta_0 + \beta_1 \sum_{k=i}^{p} Y_{t-i} + \beta_2 \sum_{k=i}^{q} X_{t-i} + \beta_3 \sum_{k=i}^{p} \Delta Y_{t-i} + \beta_4 \sum_{k=i}^{p} \Delta X_{t-i} + Ut \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..9$$

In equation 9, β_1 to β_2 are the long-run coefficients while β_3 and β_4 are the short-run coefficients. If the long-run coefficients are individually and jointly significant in explaining changes in the dependent variable (ΔY_t), a cointegrating relationship is evident.

The bond test is conducted on the coefficients of the lagged levels and lagged differences of the variables in the ARDL model. The test involves comparing the sum of the coefficients on the lagged levels and lagged differences. The bond test statistics that follow the F-distribution is typically written as:

$$F = \frac{\sum(\partial -)2}{\sum(\partial +)} \; x \; \frac{T-p-k}{p} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.10$$

Where

∂ and ß are the estimated coefficients on lagged levels and lagged differences, respectively.

P is the lag length of the model.

T is the sample size.

k is the number of regressors in the model excluding the constant and lagged dependent variable.

The interpretation of the bond test involves comparing the computed test F-statistic with critical values of the F-distribution. The null hypothesis for the bond test is that there is no cointegration, meaning that there is no long-run relationship among the variables. The alternative hypothesis is that there is cointegration.If F is greater than the upper and lower critical values, we reject the null hypothesis, suggesting the presence of cointegration. In this case, you would use the levels of the variables in the ARDL model.

If a cointegrating relationship cannot be established, the model is estimated as follows;

$$\Delta Y_t = \beta_0 + \beta_1 \sum_{k=i}^{p} \Delta Y_{t-i} + \beta_2 \sum_{k=i}^{p} \Delta X_{t-i} + U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .11$$

ARDL Error Correction Model (ECM): The existence of a long-run relationship among variables provides the basis to specify economic relationships in an error correction model to be able to study the short-run relationships between variables. The ARDL error correction model could be expressed as follows;

$$\Delta Y_t = \beta_0 + \beta_1 \sum_{k=i}^{p} \Delta Y_{t-i} + \beta_2 \sum_{k=i}^{q} \Delta X_{t-i} + \theta ECM_{t-i} + U_t \ldots\ldots\ldots\ldots .12$$

With respect to equations 7,9, 11, and 12, Δ is the first difference operator. Concerning equation 12, ECM_{t-1} is the error correction term and θ is the error correction coefficient while β_0 ,$\beta_1 \ldots \beta_n$ are the model coefficients.

Post Estimation Diagnostics: ARCH heteroscedasticity test, JB normality, and LM autocorrelation test are used for the heteroscedasticity test, test for normality of the error term of the estimated model, and autocorrelation test respectively. These tests are carried out to ensure that the estimated model meets the assumptions of regression analysis. The absence of heteroscedasticity, normal distribution of the error terms, and absence of autocorrelation are the important assumptions of regression analysis. The results indicate whether or not the estimated coefficients of the model are reliable.

4.2) Unit Root Test

Following the conduct of unit root test, the summary of the result is presented as follows;

**Table 1**: ADF Unit Root Test Result

VARIABLES	ADF STATISTICS	CRITICAL VALUES			P Values	Remarks
		10%	5%	1%		
RGDP	-3.319636	-2.612874	-2.948404	-3.632900	0.0215	I(1)
RPSC	-4.658530	-2.611531	-2.945842	-3.626784	0.0006	I(0)
LIR	-4.786291	-2.611531	-2.945842	-2.945842	0.0004	I(0)
FIN	-4.351203	-2.612874	-2.948404	-3.632900	0.0015	I(0)
INF	-3.170570	-2.611531	-2.945842	-3.626784	0.0302	I(0)
EXR	-4.046518	-2.612874	-2.948404	-3.632900	0.0034	I(1)
CKS	-10.22746	-2.612874	-2.948404	-3.632900	0.0000	I(0)
LFPR	-3.683705	-2.612874	-2.948404	-3.632900	0.0088	I(1)

The result of the unit root test indicates that the variables used in estimating the model of this study were stationary at levels and the first difference. This justified the application of the ARDL technique to estimate the model.

4.3) Data Visualization

To examine the state of financial deepening in Nigeria we use money supply to GDP ratio and, private sector credit to GDP ratio. We present the visuals of these data for the period of this study (1986-2022) along with its summary measures (mean, maximum, minimum, and standard deviation). The trend of lending rates and output growth are also presented along with their summary measures.
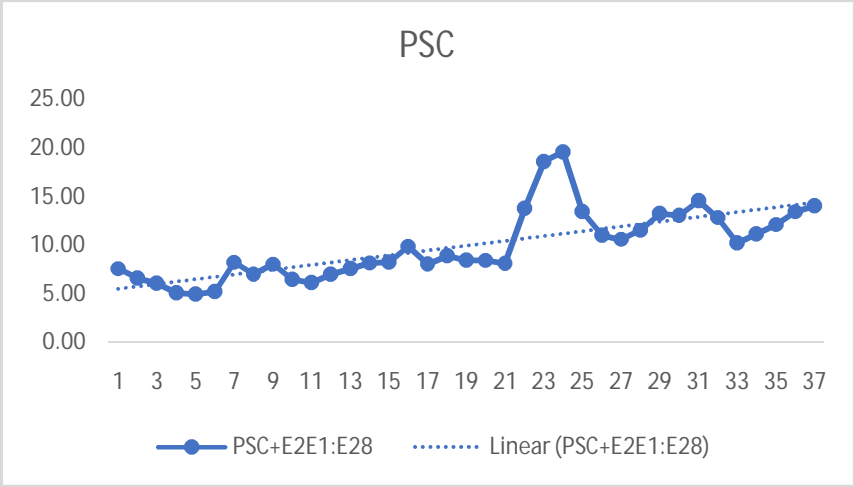
Money Supply to GDP Ratio (1986-2022)
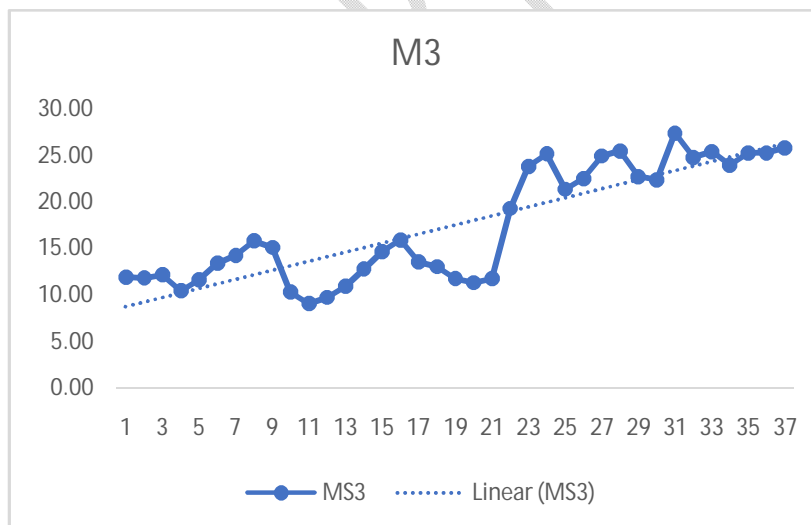
	MS3
Mean	17.47%

Maximum (2016)	27.38%
Minimum (2005)	9.06%

Figure 1: Money Supply

Private Sector Credit to GDP Ratio(1986-2022)

	PSC
Mean	9.95%
Maximum (2009)	19.63%
Minimum (1990)	4.96%
Std. Dev.	3.59%

Figure 2: Credit to Private Sector

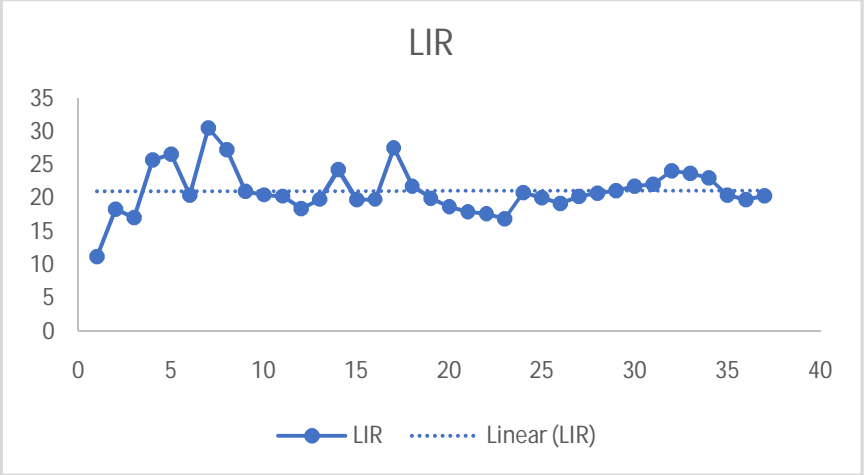*Average of Maximum and Prime Lending Rates(1986-2022)*

Figure 3: Lending Rates

	LIR
Mean	21.06
Maximum (1992)	30.50
Minimum (1986)	11.25
Std. Dev.	3.49

Output Growth(1986-2022)
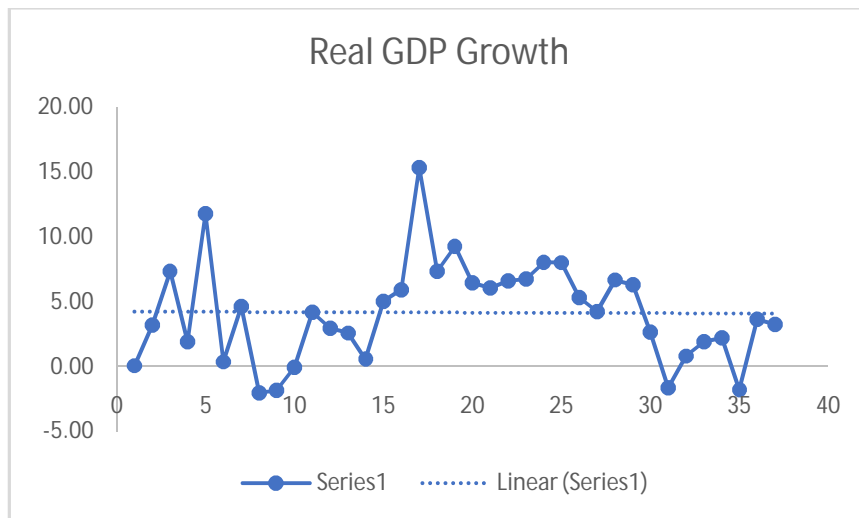
Figure 4: GDP Growth Rates

	RGDPG
Mean	4.16
Maximum (2002)	15.33
Minimum (1993)	-2.04
Std. Dev.	3.85

Data visualization of the various measures of financial deepening presented in Figures 1 and2 shows that the value of financial sector activities falls far below the value of aggregate output in the economy. The mean of the money supply to GDP and private sector credit to GDP for the data set used were 17.47% and 9.95%, respectively. Compared to many developed and emerging economies, these indicators of financial deepening are abysmally low. Figures 3 and 4 show the trend of lending rate and output growth which averaged 21% and 4.16%, respectively. While most of the financial deepening indicators are trending upward, output growth and lending rates

shows relatively stable oscillations. However, the level of financial deepening that is considered sufficient to drive output growth has not been generally established. Thus, whether the existing state of financial deepening is adequate to drive maximum production activities is an empirical question that is answered through our model estimation.

4.4) Model Estimation

The estimated model of the study presented here was arrived at after experimenting with different measures of the variables used in the model. The measures of the variables used in the model were measures that satisfied stationarity conditions, multicollinearity, and post-estimation test of the ARDL model. All variables measured in monetary terms were converted from nominal to real values by dividing the yearly nominal values by the price level. A log transformation of all variables not measured in rate was done to eliminate outliers and to enable the interpretation of the coefficients as a percentage change. Such transformation does not alter the real pattern of the data and hence, the real analytical outcomes are realized.

We start by presenting the result of the bond test for cointegration as follows;

Table 2: **ARDL Bond Test Result**

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.523140	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

The bond test for cointegration indicates that the F statistics of 9.52 is greater than the upper bound(I(1)) and lower bound(I(0)) critical values at a 5% level of significance, implying that the explanatory variables are jointly significant in explaining changes in changes in output in the long run. Thus, the null hypothesis of no levels relationship (long run relationship) is rejected and consequently, the coefficients of the levels equation are presented as follows;

Table 3: ARDL Long Run Coefficients

Dependent Variable: LOG(RGDP)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIR	0.000769	0.020428	0.037630	0.9706
LOG(RPSC)	0.026047	0.059849	0.435220	0.6705
*LOG(FIN)	0.488975	0.300057	1.629607	0.0967
CKS	-0.016804	0.014877	-1.129496	0.2791

LFPR	-0.015580	0.027312	-0.570458	0.5781
**INF	-0.023016	0.008627	-2.667844	0.0193
***C	11.18755	2.036896	5.492452	0.0001

EC = LOG(RGDP) - (0.0008*LIR + 0.0260*LOG(RPSC) + 0.4890
   *LOG(FIN) -0.0168*CKS -0.0156*LFPR -0.0230*INF + 11.1876)

Although the test statistics of the bond test show that the coefficients are jointly significant in explaining long-run changes in output, only the coefficients of financial inclusion (FIN) and inflation (INF) are statistically significant in explaining changes in output in the long run. While FIN has a positive relationship with output, with a coefficient of 0.489, INF has a negative relationship with output with a coefficient of -0.023. This implies that an increase in the number of bank branches by 1% is associated with a 0.489% increase in output while an increase in the general price level by 1 percent is associated with a fall in output by 0.023% within the period of this study.

The bond test result justifies the estimation of the error correction representation of the ARDL model as follows;

Table 4: ARDL Error Correction Coefficients

ARDL Error Correction Regression
Dependent Variable: ΔLOG(RGDP)
Selected Model: ARDL (1, 3, 1, 3, 3, 0, 3)
Sample: 1986 2022

	ECM Regression			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Δ(LIR)	-0.003423	0.001159	-2.953882	0.0112
Δ(LIR(-1))	-0.007153	0.001316	-5.433479	0.0001
Δ(LIR(-2))	-0.004270	0.001260	-3.389205	0.0048
ΔLOG(RPSC)	0.016008	0.005086	3.147169	0.0077
ΔLOG(FIN)	0.208304	0.042993	4.845063	0.0003
ΔLOG(FIN(-1))	0.004944	0.047505	0.104076	0.9187
ΔLOG(FIN(-2))	0.116314	0.040179	2.894879	0.0125
Δ(CKS)	0.001741	0.000353	4.931407	0.0003
Δ(CKS(-1))	0.003167	0.000369	8.578986	0.0000
Δ(CKS(-2))	0.002610	0.000336	7.773979	0.0000
Δ(LFPR)	-0.005580	0.027312	-0.204306	0.7781
Δ(INF)	-0.001054	0.000354	-2.974187	0.0108
Δ(INF(-1))	0.002218	0.000332	6.673481	0.0000
Δ(INF(-2))	0.000835	0.000301	2.776956	0.0157
ECM(-1)	-0.162896	0.016468	-9.891966	0.0000
R-squared	0.881144			
Adjusted R-squared	0.803888			
Durbin-Watson stat	2.054634			

During the estimation process, the maximum lag of 2 and 3 was selected for the dependent and explanatory variables, respectively while the optimal lag selection for each of the variables was automated. The estimated result shows that the optimal lag length selected ranges from 0 to 2 lags. The coefficients of the short-run error correction equation show that lending rate (LIR) has a significant negative effect on output at 0, 1, and 2 lags with coefficients of -0.003423, -0.007153, and -0.004270. This is in line with apriori expectation that an increase in lending rate reduces borrowing for productive investment leading to a fall in output. However, the size of the coefficients shows that changes in output are very inelastic to changes in lending rates.

Credit given to the private sector has a positive and significant effect on output with a coefficient of 0.016008. This is also in line with theoretical predictions that the extension of credit to individuals and firms for productive investment and consumption drives an increase in aggregate output in the economy. The spread of bank branches has a positive effect on output at 0 and 2 lags with coefficients of 0.21 and 0.12 respectively which indicates that financial inclusion also drives the growth in aggregate output. Changes in capital stock and inflation also had a significant effect on output growth. The ECM coefficient of -0.162896 implies that 16 % of the deviation of variables from equilibrium is corrected per period. This also means that it takes about 6.25 years for variables to adjust back to equilibrium.

Post-Estimation Diagnostics: Here we present the result of the test for the fulfillment of the assumptions regression analysis with respect to the error term. This includes tests for normality, serial correlation, and heteroscedasticity as presently in Table4

Table 5: Diagnostics

DIAGNOSTIC TESTS	Normality Test	Serial Correlation LM Test	ARCH Heteroscedasticity Test	RamseyReset Test
Test Statistics	0.393877	1.299383	1.401831	0.699574
P Values	0.821241	0.3115	0.6496	0.5176

The null hypothesis of the Normality test states that the error terms of the estimated model are normally distributed, that of the LM test states that the error terms are not serially correlated while the that of ARCH test states that the error terms are homoscedastic. The P values of the

respective test show that the null hypothesis for the test cannot be rejected at a 5% level of significance. This confirms the fulfillment of the basic assumptions of regression analysis about the characteristics of the error term. Thus, the inferences drawn from the estimated model are reliable. The Ramsey test which shows a probability value of 0.5176 indicates there is no sufficient evidence to suggest that the model suffers from misspecification error, indicating that the functional form is correct.

4.5) Discussion of Findings

The findings of this study show that both the size of credit given to individuals and firms in the economy and the spread of financial serviceshave significant positive effects on output. An increase in the size of credit in the economy may indicate that either existing firms are borrowing more to expand production or that people are borrowing to establish new businesses or both, leading to a rise in output. The error correction model coefficients which show the immediate effect of the explanatory variables on output indicate that on average, a 1 % rise in the credit given to the private sector leads to a 0.016% rise in output while a 1% increase in the number of bank branches contributes to output growth by 0.21% within the period of this study. The marginal effect of private sector credit on output is not unconnected with the low size of private sector credit in relation to aggregate output. Financial intermediation in Nigeria remains underdeveloped, with the size of private sector credit being small relative to the overall economy. This reflects both structural inefficiencies in the financial system and limited access to formal financial services, which constrain the full realization of credit's potential to drive growth.

The coefficient of lending rate shows that output growth is inelastic to changes in lending rate. The values of the coefficients which are -0.003423, -0.007153, and -0.004270 at 0, 1, and 2 lags, show that losses in aggregate output due to high interest rates are negligible. In theoretical terms, this implies that the IS curve for the Nigerian economy is steep. This could be explained by the fact that most of the production activities in Nigeria are not funded by the financial sector as indicated in the low private sector credit to GDP ratio. In Nigeria, dominant sectors such as the service and agricultural sectors, which has over the years contribute significantly to national output, rely less on the domestic financial sector for funding, thereby reducing the overall impact of lending rates on economic performance. This finding further points to the limitations of using

conventional monetary policy tools, such as interest rate adjustments, to regulate economic activities.

The spread of bank branches also emerges as a key factor in promoting economic growth, with a 1% increase in branches contributing to a 0.21% rise in output within the period of this study. This highlights the importance of financial inclusion, particularly in rural areas, where access to formal financial services remains limited. The spread of banking infrastructure can encourage entrepreneurship and facilitate greater economic participation, ultimately enhancing output growth. However, the result of the study also suggests that Nigeria's financial system requires deeper reforms to improve efficiency, increase the availability of credit to the private sector, and ensure that financial intermediation plays a more active role in driving economic progress.

5.0) CONCLUSIONS AND POLICY IMPLICATIONS

5.1) Conclusions

This study has shown that the state of financial deepening in Nigeria is abysmally low and hence not sufficient to drive production to the optimal level. The result of the estimated models indicates that financial deepening has the potential to contribute significantly to economic growth and financial sector efficiency. When financial systems are well-deepened, savings in the economy can be better mobilized, information asymmetry will be reduced, and capital will be more effectively allocated, thereby driving investment and growth. Financial deepening in Nigeria may not be achieved by relying totally on market equilibrium where it is expected that the market for credit and other financial services will clear and produce optimal macroeconomic outcomes. Such an assumption overlooks the numerous market failures and institutional inefficiencies prevalent in Nigeria's financial sector, such as high transaction costs, inadequate infrastructure, limited access to credit for small businesses, and a weak regulatory framework.

Therefore, financial deepening in Nigeria requires deliberate and proactive interventions in the form of policy reforms that address both the demand and supply sides of the financial market. It shouldinvolve taking actions in the form of policies (reforms) to heighten the demand and supply of credit in the economy to support real sector production activities to achieve overall growth and development of the economy. On the demand side, policies should seek to improve access to credit for businesses in the real sector. On the supply side, reforms should focus on strengthening

the capacity of financial institutions to mobilize and channel funds efficiently. Such actionsare expected to lead to increase in the production, employment, and income in the economy. This has been the justification for financial sector policies aimed at financial intermediation.

5.2) Policy Implications of Findings

Following the findings of this study, the following recommendations are given;

i) Given the low state of financial deepening in Nigeria, efforts should be made to encourage the establishment of more commercial banks and other financial institutions, to meet the Economy's need for financial services and thus drive economic growth.

ii) Since output growth is less elastic to changes in lending rate, raising the monetary policy rate to fight inflation and exchange rate depreciation is a relatively safe policy option because although it will lead to an increase in lending rate, losses in output will be minimal. For example, the highest GDP growth rate recorded between 1986 to 2022 was 15% in 2002. Prime and maximum lending rates in this period were 25% and 30%, respectively. Although the empirical findings show that on average, the effect of lending rate on output in Nigeria (1986-2022) is negative as predicted by economic theory, the coefficient of the relationship is very small, indicating that changes in aggregate output are inelastic to changes in lending rate. Thus, given the existing state of financial deepening, raising the policy interest rate in times of rapid exchange rate depreciation is appropriate.

iii) The low state of financial deepening in Nigeria shows that there are unrealized gains in the financial sector in the business of providing financial services in the economy.

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

 Option 1 is chosen

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