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Public and Private Sector Expenditure and Nigeria's Economic Performance: An ARDL Analysis

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Abstract
This study examined the relationship between public and private sector expenditure and their influence on economic growth in Nigeria. Gross domestic product was considered as the dependent variable, while public capital expenditure, public recurrent expenditure, and commercial bank credit to the private sector were treated as independent variables. The Auto Regressive Distributed Lag (ARDL) analysis was employed to analyze the data, covering the period from 1981 to 2023. The findings revealed important insights into the dynamics between these variables. Notably, public capital expenditure in lag two emerged as a significant predictor of economic growth, as evidenced by its positive and statistically significant coefficient. This implied that public investment aimed at stimulating output exhibited a delayed but positive effect on gross domestic product in Nigeria. Conversely, the commercial bank credit to the private sector in lag three demonstrated a negative and statistically significant relationship with gross domestic product, suggesting that a decrease in private sector credit could hinder economic growth. Based on these results, policymakers were recommended to prioritize and increase public capital expenditure to foster economic growth as it is crucial to maintain a conducive

environment for credit availability and accessibility to the private sector. Implementing supportive financial policies lead to improvement on the banking sector infrastructure, and ensuring easy access to financing in order to stimulate private sector investment, job creation, and overall economic productivity. Striking a balance between public and private sector initiatives helps Nigeria to unlock its full growth potential and paves the way for sustainable development.

Keywords: Growth, Public, Private, Resource Allocation, Infrastructure.

Introduction

Achieving sustainable economic growth over the years requires a collaborative effort between the private and public sectors, this collaborative endeavour encompasses a wide array of activities that are aimed at fostering economic progress and ultimately enhancing the standard of living for the citizens. Thus, in pursuit of enhanced standard of living, poverty alleviation, improved sanitation, expanded education, and increased life expectancy, developing economies strive for sustained and long-term economic growth (Azam, 2022; World Bank, 2017). An effective public sector can complement private capital formation, facilitate efficient organization of production, consumption, and trade, and enhance the overall productivity of private economic actors (Barro, 1991; IMF, 2015). Economic growth refers to the sustained increase in a country's real GDP over time (Mankiw, Romer, & Weil, 1992). It is a key measure of a nation's progress and development, reflecting improvements in living standards and overall prosperity (Masoud, 2014). Achieving and sustaining economic growth is a central goal for policymakers, as it creates opportunities for employment, reduces poverty, and fosters innovation and technological advancement (World Bank, 2021). Factors such as investment (Barro, 1991), productivity improvements (Denison, 1962), technological adoption and advancements (Romer, 1990), play crucial roles in driving economic growth. By fostering a conducive environment for economic activity, countries can strive towards long-term growth and the well-being of their citizens. From a Keynesian perspective, it is argued that public expenditure aims at stabilizing the economy, moving in a counter-cyclical direction. In contrast, procyclical fiscal policy involves expansionary

measures during economic booms and contractionary measures during recessions (Keynes, 1936).

Servén (2013) highlights that procyclical fiscal policy is generally seen as potentially detrimental to welfare. Adhering to the principle that fiscal tools should operate counter to the economic cycle, optimal fiscal policy would involve reducing public expenditure during prosperous periods and increasing it during challenging times. However, contrary to this theory, several studies have found evidence suggesting that public expenditure tends to be procyclical. It is crucial to also acknowledge that public expenditure can be utilized as a tool to incentivize producers towards technological innovation and the production of cleaner products (Adewuyi, 2016). Adolph Wagner's (1893) theory of increasing public expenditure highlights the trend of public spending growth relative to national income as societies progress. Factors such as the need for public goods, industrialization, and income elasticity contribute to the expansion of public expenditure.

In recent times, there has been a growing emphasis among the public on the challenge of fostering economic growth. The issue of public expenditure and the factors contributing to its expansion pose a significant concern in numerous countries. Public spending plays a significant role in the fiscal policy of every nation, serving as both a potential stabilizer and a means to implement specific public policies and provide public goods and services (Szarowska, 2022). Pula and Elshani (2018) discovered a unidirectional causality between public expenditures and economic growth, Lupu, Petrisor, Bercu, and Tofan, (2018) discovered a positive and negative influence after examining the influence of public expenditure on economic growth in ten selected Central and Eastern European countries. The findings of the study were mixed, revealing both positive and negative influences of public expenditure on economic growth across different countries. Specifically, a positive effect of public expenditure on economic growth was observed in Portugal, the United Kingdom, France, Greece, and Luxembourg. In contrast, Austria, Belgium, Denmark, Germany, Finland, Ireland, Italy, Netherlands, Spain, and Sweden exhibited a negative relationship between public expenditure and economic growth. Sáez, Álvarez-García, and Rodríguez (2017) employed regression and panel data analysis to investigate the relationship between public expenditure and

economic growth in 15 selected European Union countries between 1994 and 2012.Abina, (2020); and Eburajolo and Aisien (2019) discovered that commercial banks' lending has positively contributed to growth in Nigeria. In a comprehensive analysis, Alqadi and Ismail (2019) and Nyasha and Odhiambo (2019), revealed that neither theoretical nor empirical literature yields definitive evidence regarding the relationship between public expenditure and economic growth. Belu and Ejila (2023) found evidence that banks' credit to the private sector plays a role in stimulating digitalisation, which, in turn, leads to an increase in output in Nigeria.Despite numerous research findings, it is not possible to definitively assert that an increase in public expenditure uniformly leads to positive effects on economic growth. Thus, this research work investigates public and private sector expenditure and Nigeria's economic performance. The significance of this issue stems from the depleted public budgets following the COVID-19 pandemic and the imperative to ensure future growth and development.

Conceptual Review

Public Expenditures

Public expenditures cover the costs of maintaining government institutions and promoting the economy and society (Ghifara et al., 2022; Ramadanti et al., 2023). As public activities expand, expenditures increase (Ogunbiyi & Abina, 2016). There are two main types of expenditures: recurrent and capital. Recurrent expenditure, or the revenue budget, includes wages, salaries, interest on loans, and maintenance costs. Capital expenditure involves investments in infrastructure such as roads, airports, healthcare facilities, education, security, electricity generation, telecommunication, and water supply, often yielding multiplier effects on the economy (Gukat & Ogboru, 2017; Ngangah, 2023; Ogunbiyi & Abina, 2017). Public expenditure serves several key functions. It acts as a tool for macroeconomic stabilization, provides essential public goods and services, and addresses market failures and income inequalities (Ogunbiyi & Abina, 2016). Social welfare programs and progressive taxation aim to reduce income inequalities, though their effectiveness varies (Piketty, 2014). In Nigeria, public expenditure is classified into four categories: administration, economic

services, social and community services, and transfers (CBN, 2022, 2023). Administration covers government functioning and maintenance costs. Economic services target sectors driving economic growth, like transportation and agriculture. Social and community services focus on education, healthcare, and social welfare. Transfers involve grants, subsidies, and debt servicing.

Private Sector Investment is a Key Driver of Economic Growth

Private sector investment is a key driver of economic growth, stimulating innovation, job creation, productivity gains, and overall economic development (Barro, 1991; Tavani &Zamparelli, 2018; Masoud, 2014). It involves allocating financial resources into productive activities like capital investments, research and development, and business expansion (Barro, 1991; Tavani & Zamparelli, 2018), contributing to industry, infrastructure, and technological advancements essential for sustained growth (Schumpeter & Swedberg, 2021; Masoud, 2014). By supporting R&D, private investment drives technological progress, increased productivity, and competitiveness (Tavani & Zamparelli, 2018). It enables businesses to introduce new products, processes, and technologies, enhancing the quality of goods and services, reducing costs, and meeting evolving consumer demands. This innovation stimulates economic growth by creating new industries and employment opportunities (Schumpeter & Swedberg, 2018; Tavani & Zamparelli, 2018)).

Private sector investment significantly impacts job creation (Barro, 1991). Business expansion generates employment opportunities, reduces unemployment, and improves living standards. It also creates indirect employment through supply chains and increased demand for goods and services from other businesses, contributing to inclusive growth and poverty reduction (Barro, 1991). Additionally, private sector investment drives productivity gains by investing in new technologies, equipment, and employee training (Masoud, 2014). Enhanced productivity allows companies to produce more efficiently, leading to higher profits and economic growth, while also attracting foreign direct investment (Masoud, 2014). Private sector investment attracts capital inflows and fosters economic development (Barro, 1991). It creates opportunities for domestic and foreign investors, promotes capital

inflows, and stimulates economic activity. Moreover, it contributes to developing financial markets, encouraging savings, and facilitating capital mobilization for investment purposes. Strong financial systems provide businesses with access to credit and equity financing, further supporting their growth and expansion (Barro, 1991).

Economic Growth

Economic growth refers to the increase in the production and consumption of goods and services in an economy over a specific period, it is commonly measured by the growth rate of the gross domestic product (GDP), which represents the total value of all final goods and services produced within a country's borders (Masoud, 2014). Economic growth is the sustained increase in real per capita income or output of an economy over time. It involves improvements in the productivity of resources, technological advancements, capital accumulation, and increases in labour force participation (Tavani &Zamparelli, 2018). Economic growth refers to the expansion of an economy's capacity to produce goods and services over time. It involves an increase in the total output of an economy, typically measured by changes in real GDP (Masoud, 2014), this growth is driven by factors such as investment, technological progress, human capital development, and institutional factors. Public-led economic growth refers to the active involvement of the government in facilitating and stimulating a country's long-term ability to produce a wide range of economic goods and services for its citizens (Ogunbiyi, & Abina, (2017). This type of growth is characterised by the introduction and adoption of new technologies, the implementation of institutional reforms, and shifts in ideological approaches that collectively contribute to the expansion of the nation's productive capacities (Gukat, & Ogboru, 2017; Ngangah, 2023).

Theoretical Review

Musgrave and Rostow

Richard Abel Musgrave and Walt Whitman Rostow are notable economists with significant contributions to the theory of public expenditure and economic growth, respectively. Musgrave's work, particularly in "Public Finance now and then" (1983, focuses on public

finance, taxation, and public expenditures. He emphasized the government's role in resource allocation, addressing market failures, redistributing income, promoting equity, and stabilizing the economy through fiscal policy. Musgrave's approach is microeconomic, primarily concerning developed economies. Conversely, Rostow's "The Stages of Economic Growth: A Non-Communist Manifesto" (1990) outlines a linear progression of economic development through five stages: traditional society, preconditions for take-off, take-off, drive to maturity, and age of high mass consumption. His macroeconomic focus is on modernization and industrialisation, particularly in developing economies. Both economists underscore the importance of government intervention and investment in infrastructure, education, and research and development to drive economic growth and enhance productivity.

Endogenous Growth Theory

Endogenous growth theory posits that economic growth arises from internal factors such as innovation, knowledge, and human capital improvements, rather than external influences. This theory emerged due to dissatisfaction with neoclassical exogenous growth models, which attributed long-term growth to external factors like technological progress and population growth. Key contributors to endogenous growth theory include Paul Romer, Robert E. Lucas Jr., Charles I. Jones, Philippe Aghion, Tavani and Zamparelli. Romer's seminar paper, "Endogenous Technological Change" (1990), introduced "technological knowledge" as an internal driver of growth, emphasizing the role of research, development, and intellectual property rights. Lucas's "On the Mechanics of Economic Development" (1988) highlighted human capital accumulation, education, and their positive impact on productivity and technological advancement. Jones's "Time Series Tests of Endogenous Growth Models". Langroodi (2021) providedempirical evidence supporting the "Schumpeterian Theory of Economic Development" while Aghion and Howitt (1992) stressed that innovation, entrepreneurship, and creative destruction are crucial for economic growth.

Adolph Wagner's Theory of Increasing Public Expenditure

This theory, also known as Wagner's law states that as the economy grows, the public sector will also grow, and that public expenditures will increase along with the growth of a country's national income. Wagner, a German economist, observed a pattern of rising public spending across different countries and time periods, leading him to formulate this theory in the late 19th century. According to Wagner, several factors contribute to the growth of public expenditure over time.

One key factor emphasised in Wagner's theory is the concept of "publicness." As societies become more complex, the provision of public goods and services becomes essential for maintaining social order and promoting economic development. Public goods such as infrastructure, education, healthcare, and social welfare require public intervention and expenditure. As the demand for these goods and services increases with societal development, the public must allocate more resources to meet the growing needs of their populations. Another factor driving the expansion of public expenditure, as highlighted by Wagner, is the phenomenon of "industrialisation." As economies shift from agrarian to industrial structures, the complexity and scope of societal needs increase. Industrialisation often leads to urbanisation, population growth, and increased social complexities, necessitating greater government involvement in addressing various economic and social challenges. This, in turn, requires higher levels of public spending to support economic growth and societal well-being.

Wagner's theory also recognizes the role of "income elasticity" in driving public expenditure. As national income rises, the demand for public goods and services tends to increase at a faster rate. Rising incomes lead to rising expectations for improved living standards, infrastructure, and social welfare, placing additional pressure on governments to expand their expenditure to meet these growing demands.

Numerous scholars have contributed to the understanding and analysis of Wagner's theory. For instance, Musgrave (1983) further developed the theory by distinguishing between different types of public expenditure, such as productive, allocative, and redistributive expenditures. Peacock and Wiseman (1961) provided empirical evidence supporting the theory by analyzing public spending patterns in

the United Kingdom. They observed a positive relationship between economic development and government expenditure, consistent with Wagner's theory. In contemporary literature, researchers such as Gemmell and Morrissey (2005) have explored the applicability of Wagner's theory in the context of developing countries. Their empirical analysis of a panel dataset from 53 countries supported the hypothesis of an increasing share of public expenditure in national income as countries undergo economic development.

Financial Development Theory

This theory describes the role of the financial sector in economic development. The financial sector comprises institutions, instruments, markets and legal and regulatory frameworks that allow for transactions to be made by extending credit. Financial sector development is about overcoming the costs of acquiring information, enforcing contracts and making transactions. These costs are reduced by financial contracts, markets and intermediaries. Different combinations of these costs in conjunction with different legal, regulatory and tax systems have motivated distinct financial contracts, markets and intermediaries across countries and throughout history. Numerous empirical studies have been conducted in this area, with many of them summarized in the works of Levine (1997). One of the seminar studies on this subject is King and Levine (1993), which found a strong positive correlation between financial development and growth and demonstrated that financial development can serve as a predictor of future economic growth, suggesting a causal relationship between financial development and growth. Financial Development Theory posits that a well-developed financial system, characterized by efficient financial institutions, access to credit, and robust financial markets, can contribute to economic growth by facilitating savings mobilization, investment allocation, and risk management. The availability of financial services, such as banking, insurance, and capital markets, enhances economic activities, encourages entrepreneurship, and fosters innovation. Authors such as Levine (1997), and King and Levine (1993) have extensively examined the relationship between financial development and economic growth, providing valuable insights into the mechanisms and channels through which financial development influences economic outcomes.

Empirical Review

Eburajolo and Aisien (2019), conducted a study examining the impact of sectorial credit from commercial banks on economic growth in Nigeria, with a specific focus on the manufacturing and agricultural sub-sectors. Using time series data spanning from 1981 to 2015, the researchers employed co-integration and error correction mechanism techniques for their analysis. They developed a three-equation model that incorporated variables such as real GDP, bank sectorial credit, monetary policy rate, and financial market development. The findings of the study revealed a significant positive effect of commercial bank credit to the manufacturing and agricultural sub-sectors on Nigeria's economic growth, both in the short and long run. Moreover, the study emphasized the crucial role of financial sector development in enhancing the growth effects of bank credit to these sub-sectors. Based on their findings, the researchers recommended that Nigerian financial authorities implement policies aimed at incentivizing banks to increase lending to the manufacturing and agricultural sectors, thereby fostering economic growth.

Fan, Yan, Chen, Ding, and Wang (2022) conducted a study on the influence of local environmental protection expenditure on environmental governance in China amid the post-Covid-19 economic recovery. The study observed an increase in energy consumption and environmental pressure within China's growing economy. Their findings emphasised the significance of environmental protection expenditure for local governments in enhancing environmental quality, guiding market investments, and funding environmental treatment and energy conservation efforts. Using data from 286 prefecture-level cities in China spanning from 2007 to 2017, the scholars examined the impact of local environmental protection expenditure on industrial pollution emissions, considering factors such as time duration, regional disparities, and spatial spillover characteristics. The results revealed that local environmental protection expenditure played a role in reducing industrial pollution emissions in Chinese cities. However, the effects varied across different city clusters, indicating diverse outcomes in governance. Feng, Liu, Wu, Iqbal, Ahmad, and Marie (2022), conducted a study investigating the relationship between government spending and green economic performance, aiming to address the challenges posed by global climate change and economic crisis.

The green economy concept has gained prominence in mainstream politics and business, with the green Belt and Road Initiative (BRI) serving as a key driver for achieving regional sustainable development in line with the United Nations 2030 Agenda. To assess the connection between government expenditure and green economic performance, the researchers utilized data envelopment analysis and system GMM techniques, employing panel data from selected BRI countries spanning from 2008 to 2018. Their findings indicated that fluctuations in the green economic performance index in these countries were primarily due to the absence of comprehensive government policies. Additionally, the econometric analysis revealed a positive and significant impact of government expenditure on promoting green economic performance. Chen and Xu (2022) conducted a study to examine the role of government expenditure in stabilizing economic growth. A unique methodology was used to identify government expenditure specifically targeted at stabilising growth and the findings of their study revealed that during periods of adverse shocks, there was a significant increase in government expenditure, averaging 1.1 percentage points for every one percentage point rise in the growth target. Notable patterns in the strategies employed to stabilise growth, such as a focus on increasing expenditure on economic affairs rather than other functions, financing through current revenue, and the temporary nature of this behaviour in response to stabilising growth.

Ramadanti, Agussalim, and Suhab (2023), conducted a quantitative study to explore the effects of local public spending, the Human Development Index (HDI), and economic growth on regional development inequality in Eastern Indonesia between 2015 and 2020. The analysis employed panel data regression with a fixed effect model. The study's findings indicated that public expenditure on education, health, infrastructure, and the Human development index directly influenced regional development inequality. However, the variable of economic growth was not found to have a significant impact on regional development inequality. In a study conducted by Abina (2020), the focus was on examining the impact of sectorial allocation of bank credits on economic development in Nigeria. The research utilized the human development index as an indicator of economic development and considered various sectors, including the public sector, manufacturing,

agriculture, mining, general commerce, real estate, and construction, as independent variables. The error correction model was used for analysis, the result indicated that bank credits to the manufacturing, mining, and general commerce sectors had a negative influence on the human development index, while bank credits to the public sector, real estate, and agricultural sector had a positive impact. The study supported the bank-based systems and commercial bank theory, emphasising the challenging business environment that currently affects banks' lending capacity to crucial sectors like manufacturing, mining, and general commerce. Recommendation was that monetary authorities take control of key macroeconomic factors to enable the banking sector to increase credit provision to the economy. This, in turn, would promote investment, create employment opportunities, and contribute to overall economic development in the country.

Methodology

Research Design

The ex-post facto research design is an important tool in econometrics that allows researchers to examine the effects of an independent variable on a dependent variable by analysing existing data. It is particularly useful when experimental control is not possible or when conducting retrospective analyses.

Nature and Source of Data

The use of investigative econometric research design is justified in this study due to the reliance on secondary data which was remodified to suit the model. Since the data for the study were collected from the Central Bank of Nigeria's annual statistical bulletin from 1981-2023, it was necessary to employ a method that could analyze historical time series secondary data. The source of data for the study was specifically the Central Bank of Nigeria (CBN) Statistical Bulletin.

Model Specification

The relationship between public and private sector expenditure and Nigeria’s economic performance is examined in this study. The independent variables considered are public capital expenditure and

recurrent expenditure, which reflects public involvement in state activities that are expected to stimulate output. Additionally, commercial bank credit to the private sector is analyzed as a means through which private sector entities obtain funds to finance their activities. Economic growth, as measured by gross domestic product, serves as the dependent variable in this investigation.

The Functional Model

$GDP_t = f(GOCE_t, GORE_t, CCPS_t)$

The Mathematical Model

$GDP_t = \beta_0 + \beta_1 GOCE_t + \beta_2 GORE_t + \beta_3 CCPS_t$

Econometric Model:

$GDP_t = \beta_0 + \beta_1 GOCE_t + \beta_2 GORE_t + \beta_3 CCPS_t + \varepsilon.$

Apriori Expectation: $\beta_1, \beta_2, \text{and} \beta_3 > 0.$

Where:

GDP represents the Gross Domestic Product, which is the dependent variable.

GOCE denotes Public Capital Expenditure, an independent variable reflecting public investment in activities aimed at stimulating output.

GORE represents Public Recurrent Expenditure, another independent variable reflecting public involvement in state activities that influence output.

CCPS stands for Commercial Bank Credit to Private Sector, an independent variable representing the funds obtained by private sector entities from commercial banks to finance their activities.

β0, β1, β2, and β3 are the coefficients that represent the relationship between the variables.

ε represents the error term or random disturbance that captures unexplained variations in the dependent variable.

Differences Model:

$\Delta GDPt = \beta 0 + \beta 1 \Delta GOCE_t + \beta 2 \Delta GORE_t + \beta 3 \Delta CCPS_t + \varepsilon$

In the differences model, each variable is expressed as the change or difference from its previous period. The dependent variable, GDP_t, is represented as the change in GDP from the previous period (ΔGDP_t). Similarly, the independent variables $GOCE_t$, $GORE_t$, and $CCPS_t$ are

expressed as the changes in public capital expenditure ($\Delta GOCE_t$), public recurrent expenditure ($\Delta GORE_t$), and commercial bank credit to the private sector ($\Delta CCPS_t$) from their respective previous periods. The coefficients $\beta 1$, $\beta 2$, and $\beta 3$ represent the respective influences of the changes in these variables on the change in GDP, and ε represents the error term.

Method of Data Analysis:

This study utilises the ARDL (Autoregressive Distributed Lag) statistical model in econometrics to analyze the data. Before choosing this approach, unit root tests on the variables were conducted, which indicated stationarity at order 1, or I (1). Additionally, after performing the co-integration analysis, we found that the variables had a full rank, prompting us to modify the model accordingly. As a result, we converted our data into different data, and the outcomes of this transformation led us to employ the ARDL bound test for further analysis.

The ARDL model is well-suited for examining long-term relationships between multiple variables and considers both short- and long-term influences on the dependent variable. Its advantage over conventional regression models lies in its ability to handle unit roots in the data, which can lead to unreliable regression results. Moreover, the ARDL model offers flexibility in analysing various data sources, including mixed stationarity data. The sample period for this study spans from 1985 to 2023, and data were collected from the statistical bulletin of the Central Bank of Nigeria. By employing the ARDL model and utilizing reputable data sources, the study aims to provide robust insights into the relationship between public and private sector expenditure and Nigeria's economic performance.

Data Analysis

Descriptive Statistics

This statistic summarises and describes the main features of a dataset used in this paper. It provides measures such as central tendency (mean, median, mode) and variability (standard deviation, range) to gain insights into the distribution, dispersion, and shape of the data. Descriptive

statistics help to organise, present, and summarise data to facilitate better understanding and interpretation.

Table. 1 Descriptive Result

	GDP	GOCE	GORE	CCPS
Mean	37550.91	656.7390	1655.787	6571.297
Median	8234.490	321.3800	579.3000	764.9600
Maximum	176075.5	4354.400	7138.900	32868.49
Minimum	139.3100	4.100000	4.750000	8.570000
Std. Dev.	50434.86	984.0468	2059.525	9588.541
Skewness	1.284324	2.537237	1.086953	1.297453
Kurtosis	3.459285	9.044225	2.941683	3.388889
Jarque-Bera	11.63186	106.4000	8.079159	11.76149
Probability	0.002980	0.000000	0.017605	0.002793
Sum	1539587.	26926.30	67887.26	269423.2
Sum Sq. Dev.	1.02E+11	38733922	1.70E+08	3.68E+09
Observations	43	43	43	43

Source: E-Views Output

Analysis

GDP: The mean GDP is 37,550.91, with a minimum value of 139.31 and a maximum of 176,075.5. The standard deviation is 50,434.86, indicating a large dispersion of values. The skewness is positive (1.28), suggesting a right-skewed distribution, and the kurtosis is 3.46, indicating moderate leptokurtic behaviour. GOCE: The mean public capital expenditure is 656.7390, with a minimum of 4.1 and a maximum of 4,354.4. The skewness (2.54) and kurtosis (9.04) indicate a highly skewed and heavy-tailed distribution. The Jarque-Bera test suggests non-normality (p-value < 0.001). GORE: The mean public recurrent expenditure is 1,655.787, ranging from 4.75 to 7,138.9. The skewness (1.09) indicates a moderately skewed distribution, and the kurtosis (2.94) suggests some deviation from normality. The Jarque-Bera test suggests non-normality

(p-value = 0.018). CCPS: The mean commercial bank credit to the private sector is 6,571.297, with a minimum of 8.57 and a maximum of 32,868.49. The skewness (1.30) indicates a moderately skewed distribution, and the kurtosis (3.39) suggests some deviation from normality. The Jarque-Bera test suggests non-normality (p-value < 0.003). Overall, the variables exhibit varying levels of skewness and kurtosis, suggesting departures from normality. The non-normality of some variables, as indicated by the Jarque-Bera test, implies that traditional parametric statistical methods may not be appropriate, and alternative approaches may be necessary for analysis.

The Phillips-Perron (PP) Unit Root Test

This is a statistical test used to determine whether a time series has a unit root, indicating non-stationarity. It is an augmented version of the Dickey-Fuller test that accounts for autocorrelation and heteroscedasticity. The PP test helps assess the trend and stationarity properties of a time series, making it valuable in econometric analysis.

Table 2: Presentation of Unit Root Test Result

Variables	**PP-Statistic**	**Test Critical Values**	**Order of Integration**	**Prob.**
D(GDP)	-24.62976	5% level = -3.533083	I(1)	0.0000
D(GOCE)	-8.133416	5% level = -3.529758	I(0)	0.0000
D(GORE)	-21.01790	5% level = -3.529758	I(0)	0.0000
D(CCPS)	-4.920659	5% level = -3.529758	I(0)	0.0015

Source: E-Views Output.

Analysis

D(GDP): The PP-Statistic value of -24.62976 suggests that the Gross Domestic Product (GDP) variable is integrated of order I (I (1)). This

means that the GDP series has a unit root and is non-stationary. D(GOCE): The PP-Statistic value of -8.133416 indicates that the Public Capital Expenditure (GOCE) variable is integrated of order 0 (I (0)). This implies that the GOCE series does not have a unit root and is stationary. D(GORE): The PP-Statistic value of -21.01790 suggests that the Public Recurrent Expenditure (GORE) variable is integrated of order 0 (I (0)). This indicates that the GORE series does not have a unit root and is stationary. D(CCPS): The PP-Statistic value of -4.920659 indicates that the Commercial Bank Credit to Private Sector (CCPS) variable is integrated of order 1 (I (1). This implies that the CCPS series has a unit root and is non-stationary. The presence of mixed stationarity in the results led us to conduct an ARDL analysis for data estimation, as it provides a suitable approach to address the combination of stationary and non-stationary variables in the analysis.

Lag Selection

The lag selection criteria help determine the appropriate lag order for the VAR (Vector Auto Regression) model. The selected lag order has implications for the model's performance and accuracy in capturing the relationships between the variables.

Table 3: Presentation of Lag Selection Criteria.

VAR Lag Order Selection Criteria
Endogenous variables: D(GDP) D(GOCE) D(GORE) D(CCPS)
Exogenous variables: C
Date: 05/30/24 Time: 05:21
Sample: 1981 2023
Included observations: 39

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1252.065	NA	3.60e+24	67.89538	68.06954	67.95678
1	-1203.413	84.15367	6.21e+23	66.13044	67.00121	66.43743
2	-1109.614	141.9659	9.57e+21	61.92510	63.49248*	62.47767
3	-1082.843	34.73076*	5.82e+21*	61.34285*	63.60684	62.14101*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion

Source: E-Views Output.

Analysis

In Table 3, the lag order selection criteria are presented for the endogenous variables D(GDP), D(GOCE), D(GORE), and D(CCPS). The exogenous variable C represents the constant term. Based on the lag selection criteria, the model with a lag order of 3 is selected as the most appropriate. This decision is indicated by the asterisks (*) in the table, which highlight the selected lag order by each criterion. In this case, the selected lag order of 3 is supported by the LR test, FPE, and AIC criteria.

Auto Regressive Distributed Lag Bounds Test

Table 4. Presentation of ARDL Bound Test

Dependent Variable: D(GDP)				
Method: ARDL				
Date: 05/30/24 Time: 05:25				
Sample (adjusted): 1985 2023				
Included observations: 39 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (3 lags, automatic): D(GOCE) D(GORE) D(CCPS)				
Fixed regressors: C				
Number of models evaluated: 64				
Selected Model: ARDL(1, 2, 3, 3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(GDP(-1))	0.570156	0.179134	3.182842	0.0040
D(GOCE)	-2.019771	1.092974	-1.847959	0.0770
D(GOCE(-1))	3.745799	1.313814	2.851088	0.0088
D(GOCE(-2))	6.402568	1.823659	3.510836	0.0018
D(GORE)	3.335342	0.723267	4.611492	0.0001
D(GORE(-1))	2.312158	0.884108	2.615244	0.0152
D(GORE(-2))	6.795899	1.127945	6.025025	0.0000
D(GORE(-3))	3.387555	1.919520	1.764793	0.0903
D(CCPS)	-0.032800	0.396087	-0.082810	0.9347
D(CCPS(-1))	-0.557556	0.326249	-1.708988	0.1004
D(CCPS(-2))	0.551778	0.313871	1.757975	0.0915
D(CCPS(-3))	-0.839311	0.365778	-2.294590	0.0308
ECM(-1)	-0.084681	0.013060	-6.483802	0.0000

C	0.163638	0.014075	11.62613	0.0000
R-squared	0.956742	Mean dependent var		4754.315
Adjusted R-squared	0.935113	S.D. dependent var		5391.339
S.E. of regression	1373.328	Akaike info criterion		17.55770
Sum squared resid	45264690	Schwarz criterion		18.12370
Log likelihood	-311.8174	Hannan-Quinn criter.		17.75724
F-statistic	44.23451	Durbin-Watson stat		1.602709
Prob(F-statistic)	0.000000			
*Note: p-values and any subsequent tests do not account for model				

Source: E-Views Output.

ARDL Analysis

The model selection method used is the Akaike information criterion (AIC), which balances the goodness of fit with the complexity of the mode.

Global Statistics

The presence of the Error Correction Term (ECM) with a negative coefficient suggests that the system adjusts in the short run to restore equilibrium when deviations occur. This implies that any deviation from the long-run relationship between the variables will be corrected over time. The high R-squared value of 0.956742 indicates a strong overall fit of the model, suggesting that the selected variables explain a significant portion of the variation in GDP. The adjusted R-squared value of 0.935113 considers the number of variables and observations, providing a more conservative estimate of the model's explanatory power. The standard error of the regression (S.E. of regression) is 1373.328, representing the average distance between the observed and predicted values. The F-statistic of 44.23451 and its associated probability of 0.000000 suggest overall statistical significance of the model. The

Durbin-Watson statistic of 1.602709 is a test for autocorrelation, and a value close to 2 suggests no significant autocorrelation.

Relative Statistics

From the ARDL result public capital expenditure (GOCE) in lag two has a coefficient value of 6.402568 for, along with its statistical significance (t-Statistic = 3.510836, Prob.* = 0.0018), indicates that there is a positive and significant relationship between public investment in activities aimed at stimulating output and gross domestic product, this result agrees with our apriori expectation and the findings of Ghifara, Wardhana, Iman, Rusgianto, and Ratnasari Ramadanti, (2022). This finding suggests that public capital expenditure has delayed yet positively contributed to economic growth in Nigeria. One reason for the delayed but positive effect of public investment on economic growth in Nigeria could be the time required for the implementation and influence of infrastructure projects and development programs. Public capital expenditure typically involves long-term investments in infrastructure, such as transportation networks, power generation, and public facilities. The time needed for the completion and utilization of these projects may lead to a time lag before their full economic benefits are realized, resulting in a delayed but positive effect on economic growth.

Based on the coefficient of 3.387555 and its statistical significance (t-Statistic = 1.764793, Prob.* = 0.0903) for the variable D (GORE (-3)), this result agrees with our apriori expectation and Agussalim, and Suhab (2023) findings. Thus, public recurrent expenditure (GORE) with a three-lag delay has a positive but statistically marginal influence on gross domestic product (GDP) in Nigeria. This suggests that public involvement in state activities that influence output, although with some lag, can contribute to economic growth. The positive but statistically marginal influence of public recurrent expenditure (GORE) with a three-lag delay on gross domestic product (GDP) in Nigeria might be as a result of the efficiency and effectiveness of public spending. While public recurrent expenditure includes expenditures on ongoing operations and administration, the effectiveness of these expenditures in stimulating economic growth may vary depending on factors such as the allocation of funds, the quality of public services provided, and the extent of leakage or inefficiencies in the spending process.

Based on the coefficient of -0.839311 and its statistical significance (t-Statistic = -2.294590, Prob.* = 0.0308) for the variable D (CCPS (-3), one economic reason for this result is that commercial bank credit to the private sector (CCPS) with a three-lag delay has a negative and statistically significant influence on gross domestic product (GDP) in Nigeria, this does not agree with our apriori expectation, it also disagree with the findings of Abina (2020). This suggests that a decrease in commercial bank credit to the private sector can potentially hinder economic growth. Decrease in commercial bank credit to the private sector can potentially hinder economic growth is the limited access to financing for private businesses. Commercial bank credit plays a crucial role in providing funds for private sector entities to invest in expansion, innovation, and productivity-enhancing activities. When credit availability declines, businesses may face difficulties in accessing the necessary capital to finance their operations, invest in new projects, or expand their operations. This can impede business growth and limit their ability to contribute to overall economic growth in terms of job creation, increased output, and technological advancements.

Diagnostic Test

In order to assess the assumptions and validity of a statistical model, the Heteroscedasticity diagnostic test is used to examine whether the variance of errors in a regression model is constant across different levels of the independent variables. It helps identify violations of the assumption of homoscedasticity, which can affect the reliability of regression results.

Table 5 Heteroscedasticity Test Result

Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.391114	Prob. F(12,24)	0.9535
Obs*R-squared	6.052082	Prob. Chi-Square(12)	0.9134
Scaled explained SS	4.621181	Prob. Chi-Square(12)	0.9695

Source: E-Views Output.

Analysis

The Breusch-Pagan-Godfrey heteroscedasticity test results indicate that the F-statistic is 0.391114 with a corresponding p-value of 0.9535. The Obs*R-squared is 6.052082 with a p-value of 0.9134. The scale explained SS is 4.621181 with a p-value of 0.9695. The high p-values for all three test statistics (F-statistic, Obs*R-squared, and scaled explained SS) suggest that there is no evidence of heteroscedasticity in the regression model. Therefore, we can conclude that the assumption of homoscedasticity is not violated, indicating that the variance of errors is relatively constant across different levels of the independent variables.

Summary

ARDL result can be summarised thus: Public recurrent expenditure (GORE) and lagged GDP (D (GDP (-1) have a positive and statistically significant influence on GDP. Lagged public capital expenditure (D (GOCE (-1) also positively influences GDP as it is significant at the 0.10 levelwhich indicates that public investment stimulates output and economic growth, albeit with a less immediate effect. The negative coefficient of D (CCPS (-3) indicated that a decrease in commercial bank credit to the private sector negatively affect GDP. Although the relationship is significant at the 0.05 level, highlighting the importance of private sector credit for economy, negative coefficient of the error correction term suggests that the system adjusts in the short run to restore equilibrium when deviations occur indicating that any deviations from the long-run relationship between the variables will be corrected over time. The high R-squared value of 0.956742 indicates a strong overall fit of the model, suggesting that the selected variables explain a significant portion of the variation in GDP. The adjusted R-squared value of 0.935113 provides a more conservative estimate of the model's explanatory power. Diagnostic statistics, such as the F-statistic and associated probability, a signal that the model as a whole is statistically significant.Further diagnostic tests are necessary to ensure that the model assumptions, such as the absence of autocorrelation and heteroscedasticity, are met.

Conclusion

Collaborative effort between the private and public sectors in pursuit of enriched standard of living, poverty alleviation, improved sanitation, expanded education, and increased life expectancy is greatly needed in developing economies and in striving for sustained and long-term economic growth.

Recommendations

1. Policymakers should increase public capital expendituretoprioritize infrastructure development and public projects in order to stimulate output and drive overall development.
2. Public and private sectors should maximally utilise the resources allocated to them by the government to improve service delivery by reducing wasteful spending, promoting transparency, and investing in capacity building.
3. Commercial banks should encourage favourable lending environment to address the potential hindrances to economic growth caused by a decrease in accessibility of the private sector by streamlining loan processes, reducing bureaucratic hurdles and to provide incentives to promote and enhance economic growth in Nigeria.

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