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EXAMINING THE DETERMINANTS OF CAPITAL EXPENDITURE: EVIDENCE FROM NIGERIA

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ABSTRACT

Government capital expenditure has grown rapidly both in absolute, relative and as a share of GDP over the years. These growths in capital expenditure have been due to certain factors which are believed to have significant effect on the fiscal operation of the country. These perceived implications of capital expenditure expansion on the economy necessitate the need to understand factors that are responsible for the growth in capital expenditure size. For that, the study employs a slightly modified version of Wagner's law by incorporating new variables such as oil revenue, non-oil revenue, GDP, exchange rate, inflation, and population—to examine their effect on capital expenditure size. The study uses time series data for Nigeria spanning between 1982 and 2022. Time series data were analysed using Autoregressive Distributed Lag (ARDL) model. The findings of the study reveal that oil revenue, GDP, population, exchange rate have negative impact on capital expenditure while non-oli revenue and inflation rate have positive impact on capital expenditure in Nigeria and they are all important determinants of the size of Nigeria's government expenditure. The study recommended that the revenue base of the economy should be diversified beyond oil sector, strengthening of fiscal and monetary policies to ensure stability in price level and exchange rate.

Keywords*:* ARDL; Capital Expenditure; Exchange Rate; GDP Oil Revenue

1.0 Introduction

The determinants of capital expenditure, which is a crucial component of economic development, have been a subject of interest for researchers in Nigeria. Capital expenditure refers to the outflow of funds used to acquire assets that are anticipated to provide value to a business for more than a single accounting period or financial year, such as land, buildings, machinery, software, vehicles, computers, and office equipment. In the context of Nigeria, understanding the factors that influence capital expenditure is essential for managing fiscal imbalances and promoting sustainable development in a country grappling with issues of development (Bamidele al. el, 2021). The Nigerian economy has been characterized by a significant reliance on oil exports, which has led to fluctuations in economic growth and development. Despite being the largest oil producer in Africa, Nigeria has experienced low levels of economic diversification, with the oil sector accounting for over 90% of export earnings and 60% of government revenue (Bamidele al. el, 2021). This reliance on oil exports has resulted in a volatile economy, with significant fluctuations in economic growth and development.

Nigeria, Africa's most populous nation, faces the crucial task of allocating resources effectively to drive economic growth and development (Harriet *et. al.,* 2023). A key component of this strategy is capital expenditure, which refers to government spending on infrastructure, machinery, and other long-term assets. Understanding the factors that influence capital expenditure decisions is critical for policymakers aiming to optimize investments and achieve

long-term economic goals. Each and every government is saddled with the responsibility to provide for its citizens in order to better their lives. In Nigeria and other countries, there has been an increasing concern as to the pattern government spent part of its income (World Bank, 2017).

In recent years, the Nigerian government has implemented various policies aimed at promoting economic diversification and reducing the country's dependence on oil exports. These policies include the Economic Recovery and Growth Plan (ERGP), which aims to achieve sustainable economic growth, and the National Industrial Revolution Plan (NIRP), which focuses on the development of key sectors such as agriculture, manufacturing, and services. Public spending is when a country's government spends money on things that the population as a whole requires or desires, such as infrastructure, security for the protection of lives and properties, provisioning and pensions and so forth (Harriet *et. al.,* 2023).

Nigeria's public capital investment as a percentage of GDP has significantly decreased between 1981 and 2021. For example, the average public capital spending as a percentage of GDP for the years 1981 to 1989 was approximately 30.65 percent, with a mean of 3.41 and a mean growth rate of 1.72.Between 2001 and 2010, public capital expenditure as a percentage of GDP fell to 24.75 percent with a mean average of 2.5, and this downward trend has continued to the present as between 2015 and 2021, public capital expenditure as a percentage of GDP further decreased to 7.95 percent with a mean average of 1.14, while economic growth rate fell by an average of 1.09 during this time. The ongoing decline in public capital spending as a percentage of GDP is a sign that the Nigerian government is getting smaller and less involved in the economy (CBN, 2021).

Nigeria faces a significant challenge in optimizing its economic growth trajectory. While the nation boasts a sizeable population and abundant resources, translating these factors into sustained development requires strategic allocation of capital. Capital expenditure, the government's spending on long-term assets like infrastructure and machinery, plays a pivotal role in this process. Numerous factors such as population, GDP, sources of revenue both oil and non-oil revenue, inflation rate, exchange rate among other influence these decisions, and a clear understanding of these determinants is crucial for effective policymaking. The lack of a comprehensive framework for assessing the determinants of capital expenditure in Nigeria hinders the government's ability to make informed investment decisions. Currently, there is limited research on the specific factors that influence the level and allocation of capital spending inflation rate, exchange rate, interest rest, private investment, public investment and foreign direct investment (Bartholomew, Ogah & Ezihe, 2022). Glenda (2017) explained factors like economic growth, government revenue, trade openness, poverty, public debt, dependency ratio, population, and urbanisation on the search engine. oil revenue, trade openness, public debt, exchange rate, oil price, taxation and inflation (Jibir & Aluthge, 2019). Ahmed (2018) provide strong evidence that financial repression factor determines the public expenditure level in short-term and long-term, notably the economic growth factor, public debt, urban population, trade openness and structural break among others. This knowledge gap makes it challenging to prioritize projects that will yield the most significant long-term benefits for the nation. Without a clear understanding of the determinants, capital expenditure can be susceptible to short-term political or economic pressures. This can lead to inefficient allocation of resources, with projects chosen based on immediate political gains rather than long-term development goals. The main objective of the study examine the determinants of capital expenditure in Nigeria and the specific objective is to examine the long run relationship between capital expenditure and its determinants in Nigeria

2.0 Literature Review

2.1 Concept of Capital Expenditure

Capital expenditure may be defined as any expenditure other than operating expenditure that represents a large sum of money, the benefits of which extend over a period of time exceeding one year. The key characteristic of a capital expenditure is that at least a major part of the expenditure is made at one point of time and the benefits are realised at different points in time. The benefits expected are basically the inflows of income or advantages resulting from the investment. Benefits may take the form of cost saving, additional revenue or profit. The method of computing benefits may depend upon the method of evaluation used. Capital Expenditures involve long term commitment of resources to realise future benefits.

2.2 Theoretical Framework

The Wagner's Law/ Theory of Increasing State Activities

Wagner's law is a principle named after the German economist Wagner (1835-1917). Wagner (1883) advanced his 'law of rising public expenditures' by analyzing trends in the growth of public expenditure and in the size of public sector. Wagner's law postulates that: (i) the extension of the functions of the states leads to an increase in public expenditure on administration and regulation of the economy; (ii) the development of modern industrial society would give rise to increasing political pressure for social progress and call for increased allowance for social consideration in the conduct of industry (iii) the rise in public expenditure will be more than proportional increase in the national income (income elastic wants) and will thus result in a relative expansion of the public sector. Musgrave and Musgrave (1989), in support of Wagner's law, opined that as progressive nations industrialize, the share of the public sector in the national economy grows continually.

2.3 Empirical Review

Bamidele, Adebayo and Oluwasegun (2021) examined the determinants of government expenditure in Southwest Nigeria. The study adopted ex-post facto research design and it covered 10 years, spanning from 2010 to 2019. The panel data used was sourced from the CBN statistical bulletin (2019) and the annual budget of each of the sampled states. Panel data estimation techniques were used and based on the most consistent and efficient estimation, it was discovered that internally generated revenue exerts a positive significant effect on both capital and recurrent expenditure. It was equally discovered that statutory allocation exerts a positive but insignificant effect on both capital and recurrent expenditure for the period covered. Also, it was discovered that domestic debt exerts a negative insignificant effect on capital expenditure. Finally, domestic debt has a positive but insignificant effect on recurrent expenditure. It was established that internally generated revenue, statutory allocation and domestic debt are the determinant factors of public expenditure across all the states in the Southwest region of Nigeria. The study did no cover the whole country only one region was considered which make the generalization to other part of the country extremely difficult. The major determinant of federal government expenditures were not included in the model such as oil revenue, government expenditure and exchange rate which all together exert a significance influence on government expenditure in Nigeria.

Bartholomew, Ogah and Ezihe (2022) examined the determinants of government agricultural expenditure in the long and short run from 1999-2020 using Vector Error Correction Model approach. Annual time series data on agricultural GDP, agricultural expenditure, inflation rate, exchange rate, interest rest, private investment, public investment and foreign direct investment collected from the records of Central Bank of Nigeria and National Bureau of Statistics database were analyzed using inferential statistics (ADF, Johansen co-integration and VECM). The results showed that all the variables co-integrate and were stationary at first

difference. In the long run, inflation (1.118415) and private investment (0.004239) were the significant and important variables that determine agricultural expenditure. The coefficient of multiple determination (R2) was 0.925, indicating that 92.5% variation in agricultural expenditure was explained by the variables. The Error correction Term is statistically significant and negative (-0.0278) in the short run indicating a slow speed of adjustment of variables towards equilibrium. In the short run, inflation, private investment and public investment were the important variables that influenced government expenditure. The study concludes that inflation, private and public expenditures influenced government agricultural expenditure significantly and therefore recommend friendly policies to curtail inflation, conducive environment to catalyze private investment and stimulation of public investment to boost agricultural growth.

Glenda (2017) reviewed literature studies on the determinants of government expenditure for the period 1995 to 2016. The research for the studies was conducted on the internet by combining government expenditure and determinants such as economic growth, government revenue, trade openness, poverty, public debt, dependency ratio, population, and urbanisation on the search engine. The finding of the literature provides conflicting results concerning the determinants of government expenditure. The results indicate that the government expenditure relationship with its determinants is significantly positive but in some instances it was found to be negative. The study recommends that future studies use the newly developed econometric techniques on previous studies to see whether they can provide different results.

The study intends to show a model which explains the determination of the "Public Health Personnel Expenditure" in Spain for a determined period. A multiple linear regression model was applied to the period including the years 1980–2021. Macroeconomic and demographic variables were analyzed to explain the dependent variable. Variation in health personnel expenditure: "We included those variables which presented a high or very high correlation above $r > 0.6$. The variables which explain the behavior of Variation in health personnel expenditure". It was a determining factor in the present study to consider that the variables with the greatest repercussions on health policy were mainly macroeconomic variables rather than demographic variables, with the only significant demographic variable that had a specific weight lower than macroeconomic variables being "Birth Rate". In this sense, the contribution made to the scientific literature is to establish an explanatory model so that public policy managers and states in particular can consider it in their public spending policies, bearing in mind that health expenditures in a Beveridge-style health system, as Spain has, are paid with funds drawn from tax revenues (Elana et.al, 2023).

Jibir and Aluthge (2019), also examines the determinants of size of government expenditure in Nigeria. Their study incorporated new variable such as oil revenue, trade openness, public debt, exchange rate, oil price, taxation and inflation. The study utilized time series data for Nigeria between 1970 and 2017. Times series data were analyzed using Auto Regressive Distributed Lag (ARDL) model. The findings of the study revealed that oil revenue, GDP, population, trade openness, oil price, taxation and inflation are important determinants of size of Nigeria's government expenditure.

Viorela-Ligia (2023) examined the determinants of per capita health expenditures at a national level, for the European Union member states, estimating their size of impact. Unbalanced panel data for the EU-27 member states throughout 2005-2020 are modelled with the pooled OLS method for panel data, fixed effects modelling and random effects modelling. Estimations are performed on the entire sample of EU-27 member states, further split into 14 old and 13 new member states. Per capita gross domestic product as a proxy for economic prosperity, life expectancy as a proxy for health outcomes and doctors' density as a proxy for

the supply of healthcare systems positively impact the healthcare expenditures of EU-27 member states. Mixed results are obtained for assessing the impact of subjectively assessed corruption, upon healthcare expenditures, on the two subsamples of EU-27 member states. Due to the continuous growth of health care expenditures, policymakers have to draw effective cost strategies in order to temper them.

Lakshmanasamy (2021) examined the determinants and analyse the differential effects of the determinants of household education expenditure on children in India using the 2014 NSSO 71st round survey data applying the quantile regression method. Unlike the standard regression method, the quantile regression method allows estimation beyond the average effects, at different points of the distribution of household expenditure on education. The quantile regression estimates reveal that low-income households are more sensitive to changes in household income and government programmes than upper-income households. The proportion of household income spent on the education of children increases more in the lower quantiles than in the higher quantiles. Gender bias exists at the lower quantiles and is considerably less at the higher quantiles. The SC/ST households spend less than the non-SC/ST communities at the lower quantiles and the difference gets reduced at higher quantiles. Compared to scholarships, the provision of educational materials has a higher impact on household education expenditure. More children from lower quantiles attend government institutions and a substantial difference exists in household education expenditure between the student's attending government and private educational institutions. Despite government policies and programmes for affordable education, the lower-income households still incur a considerable proportion of their income on the education of their children. Keywords: Household education expenditure, socioeconomic determinants, differential effects, gender bias, quantile regression

Muhia (2019) investigated on the Modelling the determinants of government expenditure in Kenya, the findings revealed that GDP, population, trade openness, taxation, and inflation are essential determinants of the size of Kenya's government expenditure. The studies do not clearly indicate the methodology used in the study and does not explain the magnitude determinants of government expenditure in Kenya. The paper investigated the relationship between government capital spending and five distinct energy poverty proxies, this research applies the Bayer-Hanck cointegration system and the Auto-Regressive Distributed Lag (ARDL) bound test. The findings indicate that public capital spending in Nigeria worsens energy poverty by reducing access to electricity, urban electrification, renewable energy consumption, and renewable electricity generation, with a positive but insignificant influence on rural electrification.

Aluthge et al. (2021) looked into how government spending affected Nigeria's economic expansion. The study's results, which used the Autoregressive Distributed Lag model, showed that capital spending had a positive and significant impact on economic growth both in the short term and the long term. Ibrahim, et al. (2022) looked into how public health spending in Nigeria affected health indices. The study used the Error Correction model, and its results showed a long-term connection between health indicators, healthcare spending, gross domestic product (GDP) per person, carbon dioxide emissions, literacy level, and urban population. Ikubor, et al. (2022) used the ARDL model in their study on government capital investment in the economic services sector and economic growth in Nigeria, and the results showed a substantial positive association between government spending and economic growth. Okwu et al. (2022) using the Autoregressive Distributed Lag Model to examine government spending on education and the development of human capital in Nigeria, showed that recurrent and capital spending on education had adverse, insignificant effects on the gross secondary enrolment rate, whereas recurrent spending on health had a favorable,

insignificant effect. It is very clear from the reviewed literature that numerous studies have queried about what actually influence total public expenditure, impact of capital expenditure and economic growth, the determinants of recurrent expenditure from different part of the world and Nigeria. However, this study fills in the gap by to assess the determinants of capital expenditure in Nigeria which was not captured in the literature so far reviewed.

3.0 Methodology

The study is quantitative and uses secondary data collected from several sources such as the Central Bank of Nigeria (CBN) statistical Bulletin, National Bureau of Statistics and World Bank publication. In this study, total capital expenditure was used for the dependent variable, GDP proxied National Income which considered being one of the determinants of capital expenditure, population, inflation, exchange rate, oil revenue and non-oil revenue all are the important determinant of Capital expenditure.

3.1 Model Specification

Numerous propositions have been advanced to explain the growth of government expenditure. Most notable is the one associated with Wagner (1883). As noted earlier, Wagner basic hypothesis is that increase in per capita income is accompanied by increase in government expenditure. This is symbolically expressed in the following equation:

$$G\ f(Y) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

where G stands for government expenditure and Y represents income. Wagner's law has been adopted and modified in various functional forms for the past decades in analysing the causes of growth in government expenditure. Notably among them are studies by Goffman and Mahar (1971a), Gupta (1967), Mann (1980), Musgrave (1969) and Peacock and Wiseman (1961). The present study proceeds to formulate the model of public expenditure by modifying Equation (1) to incorporate other relevant variables.

For a better and deep understanding of the analysis of this work, mathematics and econometric model will be used to evaluable the preposition given in the research work. In examining the determinants of capital expenditure in Nigeria, some macro-economic variables are captured and included in the model to enable the modeling relationship between capital expenditure and its determinants. The model followed the work of Adamu and Chandana (2019) with some modifications. To measure the relationship between the determinants of capital expenditure, a mathematical expression of the relationship is formulated thus:

$$LCEP = F\ (LGDP, LORN, LNOR, LEXR, LINF, PPL) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where:

LCEP = Log Capital Expenditure
LPOP = population
INF = inflation
LGDP =Log gross domestic product
LEXR =Exchange rate
LORN = Log of oil revenue
LNOR = Log of oil revenue

3.1.1 Technique of Data Analysis

The study employed Augmented Dicker Fuller (ADF) and Phillips-Perron (PP) test of stationary to investigate the unit root. This is to find out whether the series employed are stationary or otherwise. The study used Autoregressive Distributed Lag, (ARDL) Model as developed by Pesaran et al, (2001). The model is a robust econometric technique for estimating the level of relationship between dependant variable and series of independent variables that may not necessary integrated of the same order. ARDL Model provides consistent estimation in the presence of mixture of stationary and non-stationary series, (Pesaran et al 2001). The analysis of the data has been done using the EVIEW 10 econometric package.

3.1.2 Autoregressive Distributed Lag Bound Testing Approach.

The ARDL approach to co-integration analysis involves estimation of unrestricted Error Correction Model (UECM). Hence the ARDL model for testing the nexus between public debt and educational expenditure is stated as shown below;

$$LCEP_T = \beta_0 + \sum_{i=0}^{p_1} \beta_1 LCEP_{t-i} + \sum_{i=1}^{p_2} \beta_2 LGDP_{t-i} + \sum_{i=1}^{p_3} \beta_3 LORN_{t-i} + \sum_{i=0}^{p_4} \beta_4 LNOR_{t-i} + \sum_{i=0}^{p_5} \beta_5 LEXR_{t-i} + \sum_{i=0}^{p_6} \beta_6 INF_{t-i} + \sum_{i=0}^{p_7} \beta_7 LPPL_{t-i} + \mu_t$$

$$\Delta LCEP_T = \beta_0 + \sum_{i=0}^{p} \beta_1 \Delta LCEP_{t-i} + \sum_{i=1}^{p_2} \beta_2 \Delta LGDP_{t-i} + \sum_{i=1}^{p_3} \beta_3 \Delta LORN_{t-i} + \sum_{i=0}^{p_4} \beta_4 \Delta LNOR_{t-i} + \sum_{i=0}^{p_5} \beta_5 \Delta LEXR_{t-i} + \sum_{i=0}^{p_6} \beta_6 \Delta INF_{t-i} + \sum_{i=0}^{p_7} \beta_7 \Delta LPPL_{t-i} + \theta ECM_{t-i} + \mu_t$$

After establishing the long-run co-integration, the short-run model of the ARDL can be specified in the following equation:

Table 1 Description of Variables and their Sources

Variable	Description and Measurement	Source
Capital expenditure	Nominal total Capital expenditure of the central government of Nigeria	CBN
GDP	Nominal GDP	CBN
Oil revenue	Total federally collected revenue from oil	CBN
Non- Oil revenue	Total federally collected revenue from non-oil revenue	CBN
Exchange Rate	Exchange rate	WDI
Population	Total population	WDI
Inflation	Inflation rate	WDI

Notes: CBN stands for Central bank of Nigeria and WDI stands for World Development Indicators by World Bank. All data are measured in nominal form and in local currency (Naira) and converted into natural logarithms except for inflation and trade openness that are in percentages and ratio, respectively. Source: Drawn by author.

3.1.3 Stability Test

The stability test of the model is to establish cointegration among variables. This test is necessary but not sufficient condition. Since the study employed the used of stability test

designed by Brown et al (1975) known as Cumulative Sum of the residual (CUSUM) and Cumulative Sum of the Square (CUSUMQ) if the graph of CUSUM and CUSUMQ is within the critical bound region 5% level of significance the null hypothesis is that, all the coefficient in the model should not be rejected.

3.1.4 Diagnostic Test

Diagnostic test for serial correlation, hetroskedasticity, normality and Ramsey reset test were carried out for the estimated model.

3.1.5 Breusch Godfrey LM Test for Autocorrelation

Aucorrelation is the relationship between current and past error terms and this most likely to occur in time series data. Compare to DW Test and Durbin's h-test, we choose the Breusch Godfrey LM Test because the DW test will provide inconclusive result and does not take higher order of serials correlation into account and the Durbin h test is unable to use the lagged dependant variable. In the test, there is no autocorrelation problem for null hypothesis; the null hypothesis will be rejected if the P-value of F-statistic is lower than the level of significance.

1 Breusch Godfrey Hetroscedasticity Test

To ensure that all the residual are randomly scattered throughout the range of the dependant variable, heteroscedasticity test will be used. There variance of the error would be expected to be constant for the value of the control variables, in the present of heteroscedasticity, the disturbances of the parameters are no longer normal. The decision rule is to reject the null hypothesis if the probability of the F-statistic and observer R^2 are less than 0.05, meaning heteroscedasticity is present on the other hand if the probability of the F-statistic and observer R^2 are greater than 0.05 we do not reject the null hypothesis. This indicates there is no heteroscedasticity. That is errors are homoscedastic.

2 Jarquee-Bera (JB) Test for Normality

Jarquer-Bera this test is employed to find out whether the null hypothesis of error terms are normally distributed; the null hypothesis will be rejected if the P-value of the JB statistic is lower than the level of significance.

4.0 Results and Discussions

4.1 Descriptive Statistics

Table 2: Summary Statistics

Mean	EXR	INR	CEP	GDP	NOR	ORN	PPL
Median	118.5493	9.548578	2.250525	2.994758	2.401900	2.811028	1.065988
Maximum	118.5700	8.954218	2.507016	2.914775	2.699826	3.232377	0.892592
Minimum	425.9800	17.67810	3.673280	3.256903	3.900070	3.948363	1.750912
Std. Dev.	0.670000	4.653665	0.612794	2.704851	0.474813	0.860518	0.258223
Skewness	119.2054	3.333073	0.924636	0.176779	1.098464	1.032936	0.424886
Kurtosis	0.996742	0.388723	-0.463308	0.165905	-0.435732	-0.707833	0.212491
	3.175818	2.369513	1.943745	1.408136	1.813083	2.064528	1.889359
Jarque-Bera	6.841688	1.711641	3.372749	4.517052	3.704048	4.918667	2.415809
Probability	0.032685	0.424934	0.185190	0.104504	0.156919	0.085492	0.298823
	4860.520	391.4917	92.27153	122.7851	98.47789	115.2521	43.70552
Sum	568397.2	444.3750	34.19808	1.250033	48.26491	42.67826	7.221110
Sum Sq. Dev.	41	41	41	41	41	41	41
Observations							

Table 1 suggest that the Medium, minimum and maximum value of exchange rate are (EXR) 118.5493, 118.5700, 425.9800, and 0.670000 respectively, also Medium, minimum and maximum value inflation rate 9.548578, 8.954218, 17.67810, 4.653665 respectively, it is also reported on table Medium, minimum and maximum value capital expenditures are 2.250525, 2.507016, 3.673280 and 0.612794; that Medium, minimum and maximum value of GDP 2.994758, 2.914775, 3.256903, 2.704851; that Medium, minimum and maximum value of Non-oil revenue are 2.401900, 2.699826, 3.900070, 0.474813. That Medium, minimum and maximum value of oil revenue are 2.811028, 3.232377, 3.948363, 0.860518. And the table finally indicate Men, Medium, minimum and maximum value population 1.065988, 0.892592, 1.750912 and 0.258223. However, all the variables are positively skewed given their positive skewed valued. The Jarque-Bera value of all the distribution are normally distributed since their probability value is greater than five per cent level of significance except for exchange rate.

Correlation Matrix

Table 3. Correlation Matrix.

	LCEP	EXR	INR	LGDP	LNOR	LORN	PPL
LCEP	1						
EXR	0.840304383	1					
INR	0.722462232	0.637036115	1				
LGDP	0.798917121	0.766291797	0.568815626	1			
LNOR	0.929679155	0.851541440	0.746948264	0.855631495	1		
LORN	0.952619922	0.736901309	0.706034659	0.815619109	0.920891179	1	
PPL	0.932731091	0.890031074	0.722751794	0.797672049	0.927239386	0.934492127	1

Source: Author Computation Eview 12 Softwire. 2024

Table 2 presents a correlation matrix, which summarizes the strength and direction of linear relationships between seven variables: The diagonal elements (1.000000) represent the perfect positive correlation of each variable with itself. LCEP exhibits a strong positive correlation with, EXR, INF GDP, NOR, ORN and PPL at coefficient value of 0.840304383, 0.722462232, 0.798917121, 0.798917121, 0.929679155, 0.952619922 and 0.932731091 respectively, indicating that capital expenditure tends to be associated with higher exchange rates, oil revenue, non-oil revenue, GDP, inflation rate and population.

Table 4: Augmented Dicker Fuller (ADF) Unit Root Test

VARIABLE	ADF statistics	5% CRITICAL VALUE	PROB	ORDER
INOLR	-6.244251	-2.938987	0.0000	I(I)
Innolr	-7.798250	-2.938987	0.0000	I(I)
Ingdp	-4.589879	-2.938987	0.0007	I(I)
INTGEX	-7.798250	-2.938987	0.0000	I(I)
INR	-8.798250	-2.938987	0.0000	I(I)
Inexr	-4.181817	-2.938987	0.0022	I(I)
Inppl	-3.016718	-2.938987	0.0420	I(I)

Source: Author Computation Eview 12 Softwire. 2024

Table 5 Phillips and Perron Unit Root Test

VARIABLE	ADF statistics	5% CRITICAL VALUE	PROB	ORDER
INOLR	-6.244326	-2.938987	0.0000	I(I)
Innolr	-7.986490	-2.938987	0.0000	I(I)
Ingdp	-4.513777	-2.938987	0.0008	I(I)
INTGEX	-7.986490	-2.938987	0.0000	I(I)
INR	-7.898250	-2.838987	0.0000	I(I)
Inexr	-4.099331	-2.938987	0.0027	I(I)
Inppl	-3.018160	-2.938987	0.0419	I(I)

Source: Author Computation Eview 12 Softwire. 2024

In order to examine the integrating level of variables, standard test such as Dickey and Fuller (1979) and Phillips and Perron (1988) test have been used extensively. Table 3 anf 4 shows the result ADF and PP statistics Show that, INR, LGDP, PPL, LORN, LNOR and LCEP are stationary at first difference. The result reported that they are significant at 5 per cent level of significance

Lag Length Selection

Table 6. Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-328.3115	NA	295.9385	17.04161	17.21224	17.10283
1	-157.3954	298.0075	0.105544	9.097202	9.950311*	9.403290*
2	-139.6540	27.29447*	0.099286*	9.007899*	10.54349	9.558858

Source: Author Computation Eview 12 softwire. 2024

Represents the criterion selecting the lag order, LR, FPE, AIC, SC, and HQ represent the sequential modified LR test statistic, final prediction error, Akaike information criterion, Schwarz information criterion, and Hannan–Quinan information criterion, respectively. Before applying the ARDL bound test for checking cointegration exists or not among capital expenditure, exchange rate, oil revenue, non-oil revenue, GDP, inflation, and population, it is important to select an appropriate lag order for the variables. The study employed the optimal lag order of the vector autoregression (VAR) model for the selection of appropriate lag order. The observed results in Table -4_shows the entire lag selection criteria for employing the ARDL bound test which implies that the model gives better results at lag 2 as compared to lag 0 and **ARDL Bound Test for Cointegration**

Table-7 ARDL Bound Test for Cointegration

Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		

F-statistic	3.653864	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Source: Author Computation Eview 12 softwire. 2024

The *F*-statistics value is 3.653864, which is greater than the *I(0)* and *I(1)* critical value bound. As a result, the analysis of the series shows that we reject the null hypothesis that there is no equilibrium relationship. Conversely, the table shows that the model has a co-integrating association since *F*-statistics are bigger than the upper bound critical value at all levels of significance. Therefore empirical finding concludes that there is a long run relationship between Gross Domestic Product, Oil revenue, non-oil revenue, inflation rate, population and exchange rate on capital expenditure in Nigeria of the period of study.

Long Run ARDL Result

Table – 8 ARDL Bound Test for Cointegration

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP	-0.834419	0.379044	-2.201381	0.0361
LORN	-0.382723	0.245638	-1.558078	0.1304
EXR	-0.001735	0.001033	-1.679705	0.1041
INR	0.027873	0.016146	1.726259	0.0953
PPL	-0.919346	0.402065	-2.286560	0.0300
LNOR	1.193949	0.285550	4.181221	0.0003
C	3.891750	0.920227	4.229119	0.0002

Source: Author Computation Eview 10 softwire. 2024

The estimate the long-run effects of independent variables and present the estimation results in Table 6 The empirical evidence reveals that gross domestic product, Oil Revenue, Exchange Rate and population have negative effects, some with statistically significant at the 5% level. In contrast, inflation rate, and Oil revenue exhibit positive impacts on capital expenditure. However, two of these variables are statistically significant at 5% level of significant. Furthermore, the results indicate that a 1% increase in gross domestic product decreases the capital expenditure by 83%. This is contrary to a periori statistical expectation. The result also indicated that 1% increase in Oil Revenue decreases the capital expenditure by 38% which also against the expectation, the exchange rate and inflation rate result have lesser influence on capital expenditure with -0.01% and 2% respectively. The result also shows that population has negative effect on capital expenditure with 1% increase in population decrease capital expenditure by 91% and finally non-oil revenue show a positive and significance relationship between capital expenditure with 1% increase in non-oil revenue increases capital expenditure by 119%.

The study is contrary to that of Firoj and sultana (2018) who found the positive relationship between GDP, and government expenditure, but also found the same in the case of non-oil revenue which influences the level of government expenditures positively. The study also go in line with study of Muhia (2019) which shows that GDP, population, taxation, and inflation are essential determinants of the size of Kenya's government expenditure. The study has also conformed the finding of Jibir and Aluthge (2019) who also found that oil revenue, GDP, population, taxation and inflation are important determinants of size of Nigeria's government expenditure.

Table: 9 Short-Run Relationship of the Determinants of the Size of Capital Expenditure

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LCEP(-1)	0.555430	0.173965	3.192771	0.0035
LCEP(-2)	-0.316694	0.170426	-1.858245	0.0737
LGDP	-0.635213	0.293494	-2.164311	0.0391
LORN	-0.012891	0.157262	-0.081973	0.9353
LORN(-1)	-0.278462	0.190744	-1.459873	0.1555
LNOR	0.396462	0.233762	1.696012	0.1010
LNOR(-1)	0.512447	0.233406	2.195518	0.0366
EXR	-0.001321	0.000823	-1.605247	0.1197
INR	0.021218	0.010469	2.026843	0.0523
PPL	-0.699865	0.374734	-1.867631	0.0723
C	2.962648	1.000278	2.961825	0.0062
R-squared	0.983953	Mean dependent var		2.324277
Adjusted R-squared	0.978222	S.D. dependent var		0.886288
S.E. of regression	0.130793	Akaike info criterion		-0.997650
Sum squared resid	0.478993	Schwarz criterion		-0.528441
Log likelihood	30.45418	Hannan-Quinn criter.		-0.829302
F-statistic	171.6864	Durbin-Watson stat		1.997566
Prob(F-statistic)	0.000000			
CointEq(-1)*	-0.761264	0.125939	-6.044720	0.0000

Source: Author Computation Eview 10 softwire. 2024

Table 7 presents the result of the short-run dynamic of model of the determinants of the size of capital expenditure. The short-run result reveals a negative and significant association between GDP and capital expenditure in which is similar with the long-run result. This implies that growth in the output of Nigeria's economy has not contributed in explaining the expansion of capital expenditure in Nigeria in the short run.

However, LORN the short-run result reveals a negative and insignificant association between oil revenue and capital expenditure similar with the long-run result. The negative relationship between oil revenue and capital expenditure suggests a potential over-reliance on oil revenues to finance public investment projects. This dependence may expose the economy to volatility in global oil prices, leading to fluctuations in government spending on capital projects. The short-run result also shows that LNOR has a positive and significant effect on capital expenditure size at 5% significant level which also the same as the result for long run. The short-run result also shows that population has a negative and significant effect on capital expenditure size at 5% significant level. The negative relationship between population and capital expenditure underscores the challenges posed by rapid population growth in meeting infrastructure demands.

It can also be seen from the above table, that the error correction term (ECT) which determines the degree of adjustment when occurred. The coefficient has the expected negative sign and also statistically significant at 1%. The long run relationship is further estimated by the negative sign of the ECM and its significance. It shows that if disequilibrium happened from shock in the short run is adjusted automatically to the equilibrium position in the long run by 76% annually.

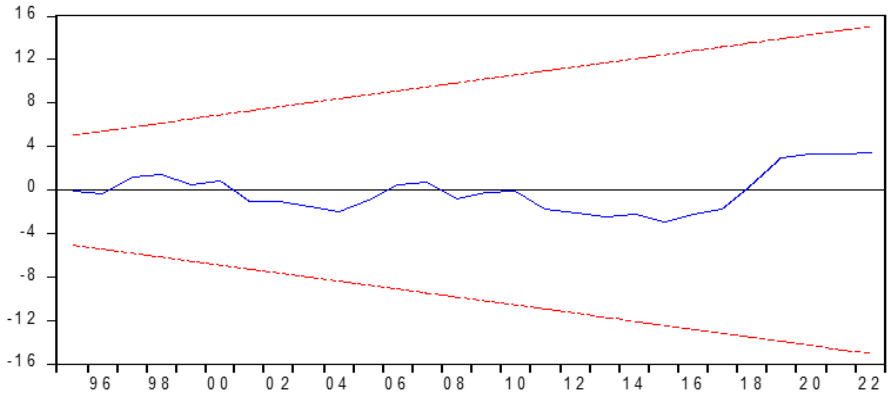
Diagnostics Test

Table – 10 Post Estimation Diagnostics Test

Diagonestic Test	F-Statistic	P – Value
Breusch-Godfrey Serial Correlation LM Test:	0.000254	0.9997
Heteroskedasticity Test: Breusch-Pagan-Godfrey	3.362771	0.1091
Stability Test	**Jarque-Bera** 0.848865	0.654141

Source: Author Computation Eview 10 softwire. 2024

In order to verify the reliability of the ARDL Model used in this study, numerous diagnostic test were performed such as the Jarque- Bera normality test (to examine normality) the Breusch-Pagan-Godfrey heteroskedasticity test (to examine heteroskedasticity) and Breusch-Pagan-Godfrey serial correlation LM test (to assess correlation). According to the results presented in the Table 8, these tests indicate that ARDL model estimated in this study is free from any problem related to normality, heteroskedasicity or autocorrelation. Further the stability of the ARDL model's is assessed using the CUSUM and CUSUMSQ test.



5.0 Summary And Recommendations

The study attempts to identify long-term determinants of capital expenditure in Nigeria using time series data spanning between 1982 and 2022. The study slightly modified the Wagner's law by incorporating other relevant variables that are assumed to be important in explaining the expansion of capital expenditure in Nigeria. To achieve this objective, the paper applied autoregressive distributed lag (ARDL) model for data analysis.

The paper obtained variety of interesting results that are helpful for future policy prescription in capital expenditure decision. The stationary properties of the time series data were checked. At level, but all variables become stationary at a first difference. However, the bounds test revealed a long-run co-integration among the variables in the model. To confirms the robustness of the results. Further, the study find that inclusion of other control variables in the models provides fairly consistent results, suggesting that population; oil revenue, non-revenue, and inflation are strong determinants of capital expenditure size. The study found that gross domestic product, Oil Revenue, Exchange Rate and population have negative effects in the short run. In contrast, inflation rate, and Oil revenue exhibit positive and significance impacts on capital expenditure in the short run. However, Non -oil revenue and exchange rate are statistically significant at 5% level of significant. Hence, the study recommends the following Given the negative relationship between oil revenue and capital expenditure, policymakers should focus on diversifying revenue sources to reduce dependence on oil. This could involve enhancing tax collection mechanisms, promoting non-oil sectors like agriculture and manufacturing, and exploring alternative sources of revenue such as tourism or renewable energy projects. By diversifying revenue streams, the government can ensure a more stable funding base for infrastructure development.

Recognizing the strain that rapid population growth places on infrastructure, policymakers should prioritize population management strategies. This includes investing in education and family planning programs, promoting rural development to reduce urban migration pressures, and implementing sustainable urban planning initiatives. By managing population growth effectively, the government can alleviate pressure on infrastructure and optimize resource allocation for capital expenditure projects.

Building on the negative relationship between GDP and capital expenditure, policymakers should implement measures to promote economic stability and foster growth. This may involve maintaining prudent fiscal and monetary policies, enhancing investor confidence, and stimulating economic activity through targeted investments and incentives. By fostering a stable and conducive economic environment, the government can ensure sustainable funding for infrastructure projects and support long-term economic growth.

Mitigation of Exchange Rate Volatility: Given the impact of exchange rate fluctuations on capital expenditure, policymakers should implement measures to mitigate volatility in the foreign exchange market. This could include building foreign exchange reserves, adopting flexible exchange rate regimes, and implementing hedging strategies to manage currency risk. By stabilizing the exchange rate, the government can minimize uncertainties in project financing and ensure consistent funding for infrastructure development.

Based on the findings regarding the negative relationship between certain economic variables and capital expenditure, policymakers should prioritize the strategic allocation of resources to high-impact infrastructure projects. This involves conducting rigorous cost-benefit analyses, prioritizing projects with the highest economic and social returns, and ensuring efficient project management and implementation. By targeting resources towards priority areas, the government can maximize the impact of capital expenditure on economic development.

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