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Macroeconomic Outcomes of Nigeria's Infrastructural Investment[1]

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Abstract: Introduction: The performances of any economy are reflected by Macroeconomic Outcomes/ Indicators (MO) especially by way of Public Infrastructures Investment (PII) expenditure both proxy by inflation, unemployment and interest rates, and income per capital and public capital expenditure respectively in this study. However, the responsiveness of MO to PII in Nigeria has been vague outcomes such as in income per capital, increasing inflation and unemployment rates that apparently contradict neoclassical theoretical economic thoughts. **Objective:** This study set out to examine the casual effects and relationship between PII and the selected related macroeconomic outcomes in Nigeria. **Research Methodology:** Using time series data between year 1990-2020 and adopting econometric techniques such as co-integration by Bound test approach of Autoregressive Distributed Lagged (ARDL) and pairwise causality test for its analysis. **Findings:** The study revealed that PII has no significant long run relationship or casual effect on macroeconomic outcomes evident in the negatively significant and positively insignificant relationship between public capital expenditure, unemployment and interest rates, and no causality between public capital expenditure, inflation rate, and income per capita. **Conclusions & Policy Recommendations:** Based on these findings, it concludes that neoclassical theoretical economic thoughts is in abeyance in Nigerian economy and recommends increased and focused capital investment expenditure to infrastructures development in order to stimulate favorable macroeconomic outcomes and enhance economic performance of the economy and welfare of Nigerians because of the increasing centrality of infrastructures to attaining sustainable socioeconomic development of economies and future economic objectives in developing nations like Nigeria.

Keywords: Capital Expenditure; Economy; Infrastructures; Macroeconomic; Nigeria

JEL Classification: E63; Q51; Q54

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1. Introduction

1.1. Background

Significantly, infrastructures development exerts divers pressures and concerns on the economy as reflected by macroeconomic outcomes (Cumming & Cramon-Taubadelb, 2018; Babatunde, 2018). This accentuates the relationship between macroeconomic outcomes or indicators and infrastructures development the world over especially in developing nations like Nigeria. Macroeconomic outcomes (MO) allude to the aggregate of economic decisions and interactions of government, individuals and firms in the economic system (Upreti, 2015), verifiable by economic variables such as like income per capita, inflation, interest and unemployment rates etc., believed to reflect the economic health of a nation's economy (Jhingan,2011; Edeme, 2018), while Public Infrastructural Investment (PII) relates to efficient public finance management through fiscal provisions such as capital expenditure investment on infrastructures development via the national budget and economic policies (Olaoye, 2016). Infrastructures cover a huge type of factor inputs categorized into transport, energy, water supply and sanitation, housing and telecommunication assets that is central to and enhance other economic sectors' performance, growth, improvement and development.

1.2. Statement of the Problem

However, the trajectory of PII expenditure performance in Nigeria has been generally unstable, disappointing and impairing across economic sectors as reflected by the several economic indicators. For example, a Federal Ministry of Finance (2021) report revealed that between years 2000 and 2020, public capital expenditure amounted to about N18.45 trillion, with the highest and lowest capital spending of N2.286 trillion and N239Billion in 2019 and 2000 fiscal years respectively apart from off-budget capital investment through the $6.3Billion foreign loans on specific infrastructures development (Debt Management Office (DMO,) 2018). Specifically, the Nigerian Minister for Education reported that, in the education sector, about N6.300Trillion was spent out of which N533Billion or just 9% were capital expenditure between 2015-2022. Resultantly, the Building and Construction Sector (BCS) could only contribute average of 4.5% to GDP while the economy grew at an average of 5.7% GDP growth within the period (National Bureau of Statistics (NBS), (2021). Specifically, interest rate averaged 16.75 % over years 2001-2019, reaching an all-time high of 25.5% in 2017; inflation rate at 6.9% (year 2000) increased to 13.8% (2010), climaxed 18.5% in 2016 rose again to 18.5% in 2020; unemployment rate rose from (18.5%) to about 33% between year 2010 and 2020, and per capita income instability hover between $1750 and $2,4205 between years 2010 to 2020 (Onodugo, Obi, Anowor, Nwonye & Ofoegbu, 2017;World Bank, 2019; Adelakun ,

Afolabi & Abuh , 2020; National Bureau of Statistics (NBS), 2021). In other views, budget deficit and public debt may directly and negatively exert on capital expenditure, fiscal sustainability and the gamut of macroeconomic credibility in any economy especially in the developing nations like Nigeria.

These simply show the non-responsiveness of MO to PII in Nigeria, apparently contradict theoretical thoughts of the Keynesian neoclassical theory and adduced to several reasons including decreasing and inefficient capital spending (Kabiru, 2016), impaired effects of fiscal policies and total debt stock on the Nigerian economy (Festus & Saibu, 2019) etc. Researchers and stakeholders have shown deliberate research concerns and efforts (Manasse et al., 2018; Saka, 2019; Onifade, et al.,2020) yet the economic narrative remain unchanged.

1.3. Objectives

This study queries the specific nature of the issues as whether public capital investment expenditure explains macroeconomic outcomes in Nigeria? It generally examines the effects and relationship between PII and MO in Nigeria but specifically to investigate casual effects of public capital expenditure on unemployment rate and interest rates and to assess the relationship between public capital expenditure and inflation rate and income per capita in Nigeria. This is on the increasing centrality of infrastructures development to attaining macroeconomic performance in developing economies like Nigeria as a result of public capital spending in other to help public policy decisions.

The rest of this paper is organized as follows: literature reviews, methodology, analysis and discussion of findings, conclusion and policy recommendations.

2. Literature Review

2.1. Conceptual Review

Macroeconomics essentially dwell on the aggregate performance and the behavior of the economy with focus on forces or factors that determine the levels of aggregate production, employment and prices, and overall level of a nation's economy output (Ismaila, & Imoughele, 2015; Bodunrin, 2016). Dwivedi (2019) listed macro variables of the goods market to include gross domestic product (GDP), consumption expenditure, government expenditure, aggregate savings and investment, total export and import, government revenue (taxes), while the market variables include interest rate, inflation rate, exchange rate, money supply and demand, balance of payment. Both goods-market macro-variables are interrelated, interdependent, control and influenced by macroeconomic instruments (fiscal and monetary policies) with the former focusing public finances and the latter dealing with changes in

money supply and demand, price stability (Inflation rate), employment, interest rates, income per capita etc., through appropriate mechanism and monetary authorities (Ayodeji & Ajala, 2018). Public infrastructures development include transport (road, air, water and railway) energy (electricity), water supply and sanitation (dams, irrigation, waste plant), housing (residential, institutional, resort) and telecommunication infrastructures characterized as social and economic, long-term and capital-intensive (Babatunde, 2018;Zhang, 2019). Pereira & Pereira, (2018) argued that well-conceived and ambitious infrastructure assets investment have been linked with economic benefits, define economy of modern economies, facilitates economic flow cycle and contribute directly or indirectly to socioeconomic growth and development as reflected in macroeconomic performances.

Macroeconomic variables and infrastructure investment interact and influences each other such that they reflect investment and consumption expenditure patterns in the economy. For example, Chakrabarti, (2018) emphasized the net contribution of infrastructures to Nigeria's per capita growth performance in spite of the unpredictability of power supply and transport networks while high inflation and exchange rates trigger pressure in the supply and demand sides of infrastructure investment and consumption (Musarat , Alaloul & Liew, 2021) and higher unemployment rate from infrastructure investors' perspective. Again, lower interest rate encourages borrowing for infrastructures investment expenditure due to cost of finance, but discourages savings of income (Manasseh, et al., 2018), influence national income output or (GDP) that determines income per capita as economic health and capability of citizens in any economy (Ebi & Ibe, 2019).

2.2. Theoretical Review

Neoclassical theorist like John Maynard Keynes, postulated the General Theory of Employment, Interest and Money stating that efficient government participation and interventions in the economy influence macro-economic growth variables in long term space and emphasized increased government expenditure with capital spending on social capital goods to shift aggregate demand, correct market failures, create more employment, increase money supply and enhance stability of price level in the economy. This means that direct proportionality of government's investment expenditure is expressed in certain macroeconomic exogenous variables modeled thus;

$$Y = f(S,C, I) \quad (1)$$

Where saving (S), real consumption (c) and or investment (I) expenditures is a function of real income (Y) but not necessarily proportional. Buttressing Keynes's views, Manasseh, *et al.* (2018) submitted that income earned is either saved, consumed or invested with overall implication on the whole economy but may be

limited by market size, capacity to save and inducement to invest and volume of production like in less developed economies with effects on macroeconomic outcomes such as income level, money supply, aggregate demand" employment, price stability etc. However, Aregbeyeni & Kolawole (2015) criticism of the postulations hangs on Irving Fisher's theory of interest rate that investment and consumption expenditures with theoretical expression of increasing capital spending is a function of changes in interest and inflation rates that undermines efficiency of fund, crowd out more private sector investment that provoke innovation and competitiveness hence induces unemployment and low economic growth. This study therefore juxtapose these views that long run and short run causal relationship of public capital investment in an economy runs from government expenditure as a function of revenue with socioeconomic implications evident in certain macroeconomic outcomes.

2.3. Empirical Review

Estache,Perrault & Savard, (2012) constructed a standard CGE model to explore the impact of scaling up infrastructure spending in six African countries to stimulate growth using various infrastructure investments funded with different fiscal tools variables like foreign aid fund, balance of trade account and economic growth. The study showed that foreign aid has Dutch disease effects on growth that strongly dependent on the type of investments performed. Ebi & Ibe, (2019) examined the causal relationship between government expenditure and unemployment using time series secondary data on Unemployment rate, recurrent and capital expenditures covering 1981 to 2017and adopting Cointegration techniques to test for long-run equilibrium relationship between the variables. The study found a long-run positively significant relationship between unemployment rate and capital expenditure but with no causal effect generally and concluded that a change in government expenditure will impact unemployment rate hence recommended re-allocation of capital expenditure to enhance employment and productive sectors opportunities. Nduka, Ananwude & Osakwe, (2019) used Autoregressive Distribute Lag (ARDL) and Granger Causality approach to re-examine nexus between government expenditure pattern and Nigerians' standard of living (proxy by per capita income) from 1981 to 2018, and found that government expenditure has significant effect on the standard of living despite dearth of basic infrastructures coupled with abandoned capital projects, high volatility in inflation rate etc. However, the surprising result informed the recommendation for channeling more resources to the social sector to significantly improve per capita income. Omodero, (2020) discovered that there are several factors influencing public infrastructure investment in Nigeria by investigating behavior of selected macroeconomic factors such as inflation, exchange rate, total expenditure, population, debt servicing and

Real GDP on government capital investments over a period from 2000 to 2017 by using ordinary least squares technique. Specifically, the study found that Real GDP, population number, Inflation rate have insignificant and negative impact on capital investments, while debt servicing has a significant and negative influence on government capital expenditure. The study recommended that capital investment in infrastructures be given the basic consideration to achieve its economic objectives. Recently, Akobi, Umeora & Atueyi, (2021) examined the effect of government expenditure on inflation rate in Nigeria spanning 1981-2019 to ascertain the effects of government expenditure on agriculture, education, health and telecommunications using multivariate regression based on Johansen co-integration and Error Correction Model (ECM) estimation techniques. The study found that government expenditure on health and telecommunications have positive and significant effect on inflation rate. This study recommended that increased resources to enhance productivity while providing adequate infrastructures to facilitate economic growth and reduce high inflation rate.

2.4. Research Gap

The plethora of studies reviewed do not focus on relationship between Public Infrastructure Investment and macroeconomic outcomes directly like Nduka, Ananwude & Osakwe, (2019) and Omodero, (2020) that are lopsided. This study intends to specifically investigate relationships and casual effects of PII on the economy evident from outlined macroeconomic outcomes in order to fill the gaps in study and literature by applying econometric models and techniques.

3. Methodology

This study qualitatively explored related literature on effects and relationship between the study variables toward achieving the study objectives. However, quantitative analysis adopts a theoretical production function (linear relationship) endogenous framework and empirical model from the work of Nduka, Ananwude & Osakwe, (2019) with modifications. While Nduka, Ananwude & Osakwe, (2019) used Per Capita Income (PCI), Government Recurrent Expenditure (GREXP) and Government Capital Expenditure (GCEXP) as their variables expressed in a model as in # 2,

$$\boldsymbol{PCI_t = \alpha_0 + \alpha_i\, GREXP_t + \alpha_2\, GCEXP_t + \mathcal{E}_t} \quad (2)$$

Where α_0 is the intercept, $\boldsymbol{\alpha_{i\text{-}2}}$ are the slope that measures the long-run effect and $\boldsymbol{\mathcal{E}_t}$ is the residual term using times series data from 1981 to 2018 obtained from Central Bank of Nigeria and World Bank, they used only GREXP and GCEXP as a transmission medium to PCI while there are more media. Arising from the

theoretical, empirical framework/model and the deficiency expressed above, this study modified endogenous regression model use in order to make them conceptually and realistically relevant and to be in tandem with the objectives of to this study using time series secondary data spanning 30years (1990-2020) sourced from World Development Indicators and National Bureau of Statistics of Nigeria.

3.1. Model Specification

From the conceptual review, PII arises from government Capital Expenditure (CAPEX) as investment expenditure and MO alludes to impacts and impairment of aggregate of socioeconomic decisions of government as a function of fiscal and monetary instruments variously expressed in but not limited to inflation, interest and unemployment rates and income per capita. This follows for this study; PII is proxy by government capital expenditure (CAPEX) as investment expenditure as a function of Macroeconomic Outcomes (MO), mathematically expressed as;

Public Infrastructural Investment (CAPEX) = *f* (Macroeconomic Outcomes)

CAPEX = *f* (MO) (3)

For this study, Macroeconomic Outcomes (MO) is decomposed thus;

MO=*f (Inflation rate+ Interest Rate+ Unemployment Rate + Income per Capita)* and mathematically expressed as;

MO= *f* (INF+INT+ UNE+INC) (4)

Therefore, expressed as linearized;

CAPEX = *f* (INF+INT+ UNE+INC) (5)

Moreover, based on the fact that all the variables of the model are not in the same unit scale, there is need to take the semi logarithm functional form of some of the variables in #5 to reduce wide variation amongst the variables. Expressing equation #5 econometrically as a function of period of time (*t*) then,

$$\mathbf{CAPEX}_{t-j} = \beta_0 + \beta_1 INF_{t-j} + \beta_2 INT_{t-j} + \beta_3 UNE_{t-j} + \beta_4 \mathbf{LOG}INC_{t-j} + \varepsilon_t \quad (6)$$

Where, $CAPEX_t$ *is* Capital Expenditure at time t over a lag time j, INF_{t-1} is Inflation Rate *at time t over a lag time j;* INT_{t-j} is Interest Rate *at time t over a lag time j;* UNE_{t-j} is Unemployment Rate at time *t over a lag time j;* β4LOGINC_{t-j} *Log* of Income Per Capita at time t over a lag time j; ε_{t-j} *is* the disturbance error at time *t over a lag time j and* β_0 is the intercept, β_1 to β_4 are Coefficients of the explanatory variables respectively.

The a'priori expectations of the explanatory variables control the dynamic of the model. Based on empirical literature, components of MO are expected to have

significant and positive relationship with CAPEX such that a change in any of the explanatory variables is expected to have positive impact on the explained variable, expressed in mathematical forms below;

$\frac{\partial y}{\partial INF} = \beta 1 > 0, \frac{\partial y}{\partial INT} = \beta 2 > 0, \frac{\partial y}{\partial \mathrm{UNE}} = \beta 3 > 0 \frac{\partial y}{\partial \mathrm{logINC}} = \beta 4 > 0$where ∂y is ∂CAPEX

3.2. Estimation Procedure

The procedures for the estimations in this study are in two stages sequentially thus: preliminary stage to estimation analysis. The preliminary stage will involve descriptive statistics of the variables for manageable decision making using means, standard deviation, skewness etc., in other to determine the degree of centrality and dispersion of the variables etc. Stationary test was conducted on the variables using the unit root test of the series data adopting only the Augmented Dickey Fuller (ADF) technique at level (#7a) and at first difference (#7b) to estimate the series stationarity in order to avoid spurious, unstable and unpredictable result by adopting equation model as follows:

$$\boldsymbol{Y_t = \alpha_0 + \varphi Y_{t-1} + \sum \alpha_1 Y_{t-1} + e_t} \quad \textbf{(7a)}$$

$$\boldsymbol{\Delta Y_t = \alpha_0 + \alpha_{t-1} + \varphi Y_{t-1} + \sum \alpha_1 \Delta Y_{t-1} + e_t} \quad \textbf{(7b)}$$

In both equations, Y_t is the vector of the variable of interest, α_0 Is the slope or intercept, Δ is the first difference operator, t is time trend, Y_{t-1} is lag variable of interest, ΔY_{t-1} is first difference lagged and φ parameters of the vector and e_t the error term. In the models, testing for stationarity, the null hypothesis is stipulated as $\varphi > 0$, with the alternative hypothesis $\varphi < 0$. That is, the time series data is stationary when the absolute critical value of ADF is greater than t-statistic value and at the corresponding P-value less than 5 per cent significance and null hypothesis is accepted and otherwise for alternative hypothesis.

The estimation analysis at the second stage follows from the behavior of the variables in previous stage to determine the number of cointegrating vectors and examines whether a long-run relationship exists between the dependent and the independent variables. This study employed cointegration test by way of bounds test approach of Autoregressive Distributed Lagged (ARDL) model as first developed in the work of Pesaran, Shin &Smith, (2001) expressed in #6 above. Where the critical value of F-stats is greater that the upper and lower bound values, it indicates existence of long run co-integration, where otherwise, it shows no long run co-integration in the model. Sulaiman & Abdul-Rahim (2018) underscored the several advantages of the approach to include its applicability regardless of the order of integration of the variables in a model (i.e., whether they are I (0), I (1) or mixed, both short- and long-

run coefficients can be simultaneously obtained while capturing both short- and long-run dynamics cointegration relationships and preferred for small time series samples (30-80) and a finite sample. Causality test was employed to investigate the effects and direction of causal relationship between two sets of variables by using general Pairwise Granger causality test model specified follows:

$$\mu\Delta y_t = \Sigma\delta Z_{t-1} + \Sigma \underline{\psi} \Delta X_{t-1} + e_i \quad (8)$$

Where Y, Z an X are any of the series variables assumes status of a vector alternatively and uncorrelated, and at appropriate number of lags and Granger-cause one another, $\underline{\delta}, \underline{\psi}$ *and* $\underline{\mu}$ are their coefficients, not equal to zero to give bi-directional situations. The null hypothesis of no causality between two variables cannot be rejected if the probability value of the F-statistics is >0.05 (P > 0.05). Contrarily, the null hypothesis is rejected if the probability value is ≤0.05 (P ≤ 0.05).

4. Analysis and Discussion of Findings

4.1. Preliminary Stage Analysis

Table 1 below shows the descriptive statistics of data such as mean, standard deviation, skewness to measure several degrees of dispersions of the variables over a period of 31 years (1990-2020).

Table 1. Descriptive Statistics

	CAPEX	UNE	INT	INF	INC
Mean	646.27	13.06	3.19	18.26	1415.40
Median	519.5	14.70	5.79	12.55	1268.38
Maximum	2288.99	33.43	18.18	72.83	3098.98
Minimum	24.04	1.95	-31.45	5.388	270.22
Std. Dev.	548.54	7.61	10.456	16.60	930.53
Skewness	1.099	0.198	-1.36	2.109	0.25
Kurtosis	3.978	2.89	5.30	6.360	1.54
Jarque-Bera	7.479	0.216	16.53	37.57	3.06

Source: Author's Computation.2022

As indicated on table 1, a cursory view at the response of the independent variables to CAPEX shows that highest expenditure (2,288.Billion) in year 2019 could produce interest and unemployment rates and Income per Capita at 4.52%, 20.30% and $2,229 respectively which are higher than their mean values while inflation rate 11.39% is lower than its mean value. The standard deviation value for INC (930) is most volatile and UNECAPEX (548) is least volatile in the series whiles the skewness statistic for INT (-1.36) is the only negative suggesting that a long left tail distribution.

Table 2. Stationarity Test - Unit root

Variable	Level			First difference			Remark
	t-statistic	Critical Value	P-Value	t-statistic	Critical Value	P-Value	
CAPEX	-0.905	-2.976	0.773	-5.327	-2.976	0.000	I (1)
INF	-2.585	-2.964	0.108	-4.422	-2.968	0.002	I (1)
INT	-3.277	-2.964	0.025	-6.363	-2.968	0.000	I (1)
LOGINC	-0.579	-2.964	0.861	-4.217	-2.968	0.003	I (0)
UNE	-0.471	-2.964	0.884	-5.223	-2.968	0.000	I (1)

Source: Author's Computation, 2022

The results on table 2 above shows mixed orders of integration at I (1) and I (0) by the variables at first difference and level as indicated by the comparison of the absolute critical value of ADF, t-statistics values at their corresponding P-value less than 5 per cent significance. This result further shows the direction of analysis to determine the long and or short run co-integration relationship between the variables.

4.2. Estimation Stage Analysis

4.2.1. Cointegration

The estimation techniques adopted in this case is the co-integration by bounds test approach of Autoregressive Distributed Lagged (ARDL) as presented in table 3 below.

Table 3. ARDL Bounds Test

F-statistic	**Critical Value Bounds**		**Significance**	K
	UPPER I (1)	**LOWER I (0)**		
0.826	4.01	2.86	**5%**	4
	5.06	3.74	**1%**	

Source: Authors' computations, 2022

From Table 3, the *F*-statistic value of 0.826 is far below compared with the critical values of both upper and lower bounds at 5% and 1% significance levels indicating that there is no sustainable long run co-integration between CAPEX and INT, LOGINC, INF, INT variables in the model, hence the null hypothesis of no co integration is accepted. Arising from the result of bound test, the short run estimate follows the ARDL approach at lag length of one (1) adopting **# 6.** Table 4 below shows the result of the Lag order criterion/length structure using Akaike information criterion (AIC) and table 5 represents the ARDL result.

Table 4. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-206.5007	NA	126989.5	14.58626	14.82200	14.66009
1	-199.9124	10.45041*	86598.82*	14.20086*	14.48375*	14.28946*
2	-199.6566	0.388199	91493.09	14.25218	14.58221	14.35554

Table 5. Autoregressive Distributed Lagged (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
CAPEX (-1)	0.793559	0.214771	3.694909	0.0011
UNE	-3.963691	14.75779	-0.26858	0.7905
INT	4.919561	8.57539	0.573684	0.5715
C	-813.2699	745.5954	-1.09077	0.2862
R-squared	0.807813	Durbin-Watson stat		1.73482
Adjusted R-squared	0.767775	F-statistic		20.17573

Source: Authors' computations, 2022

From Table 5 above, the coefficient of unemployment rate (UNE) -3.96, depicting that one percent increase in unemployment rate is as a result of about (0.794) or 79% decrease in capital expenditure (CAPEX) in the period under review, but not significant at 5% level, while the negative sign did not conform to a priori expectation theoretically. However, the coefficient of Interest rate (INT) 4.92, is positive but not significant impact on capital expenditure (CAPEX) within the period under review and positively conform theoretically to a priori expectation. Further from table 5, the short run dynamics results reveals that R-Square (R^2) is 0.8078, indicating that 80.78% of total variations the dependent variable are caused by the explanatory variables (UNE and INT) while the remaining 20% variation is caused by factors outside the model covered by the error term. Durbin Watson (D.W) value is 1.734, suggesting that there is the absence of serial autocorrelation in the model.

4.2.2. Causality Tests

Table 6 shows the Pairwise Granger causality test result based on equations *#8* at the lag length of one (1). It shows that all the variables expressed probability value greater than 0.05 or (P > 0.05), hence the null hypothesis of no causality between any two variables is accepted particularly amongst variables of interest in the study. Also, based on the result, no direction of causal relationship is shown.

Table 6. Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Remark
CAPEX does not Granger Cause LOGINC	30	0.27418	0.6048	No Causality, Accept Ho
LOGINC does not Granger Cause CAPEX		2.15431	0.1537	No Causality, Accept Ho
CAPEX does not Granger Cause INF	30	0.90546	0.3498	No Causality, Accept Ho
INF does not Granger Cause CAPEX		0.04374	0.8359	No Causality, Accept Ho

Source: Author's Computation, 2022

4.3. Discussion of Findings and Practical Implications

The analyses above show and inform several practical implications. First, increased public capital spending has positive relationship and effects on Income per Capita due to economic growth and reduces inflation rate. It supports that more of government participation and interventions in the economy by planning and increasing budgetary allocation to certain infrastructures development like energy (electricity) and transport will to improve industrial production and growth which in turn creates space to redistribute national income amongst citizens according to (Ogar, Arikpo & Suleiman, 2019). However, the Nigeria experience in the period under review in Nigeria shows that no significant effects of capital investment expenditure on interest rate and unemployment rates. It underscores the concern for value-for-money investment, agitations the people for creating jobs and certainty of Irving Fisher's theory of interest rate undermines efficiency of fund, induces unemployment and low economic growth and agrees partly with finding of Jideofor, Michah &Eke, (2021) that certain economics outcomes are not positively responsive to public capital iinvestment like infrastructures development in Nigeria.

Again, the findings show that while there is negatively insignificant relationship between capital expenditure and unemployment rate, it has positive but insignificant relationship with Interest rate in Nigeria. Ebi & Ibe, (2019) found that a change in government capital expenditure impact unemployment rate. By implication the Building and Construction Sector (BCS) is not the largest employer of labour in Nigeria evident from just 4.5% to GDP, hence its non-significance may be due to the fact that agricultural sector provide over 50% of employment and not the building and construction sector that handles infrastructures development in Nigeria. Again, the result is in tandem with Manasseh, et al., (2018) that lower interest rate encourages investment expenditure but not proportionally with savings because of low disposable income of Nigerians. This is because higher inflation rate devalues net income of the people and government and hence increases consumption rather

than investment expenditure and savings that is required to finance infrastructures projects development.

The causality effects implication from the analysis show that the change in the government Capital expenditure (CAPEX) expended on public infrastructures development is not and may not be responsible for the changes in macroeconomic outcomes particularly inflation rate and income per capita in Nigeria within the period under review. Oyinlola & Akinnibosun, (2013) and Agu, Okwo, Ugwunta & Idike, (2015) submitted that many others factors e.g. government revenue, exchange rate, debt finance etc., may exert relevant pressures on the economy. Omodero, (2020) shows that inflation rate has insignificant and negative impact on capital investments in Nigeria. Generally these results aligned with the admittance of the Federal Government of Nigeria in the Medium-Term National Development Plan (2021-2025), that the economy faces challenging macroeconomic environment that is reinforced by high reliance on crude oil for government's revenue and exports with repercussions of shocks in critical economic areas of foreign exchange regimes; low and limited productivity capacity of the private sector for investment returns, Weak Infrastructure and high operation cost hampering competitiveness in the global market.

4.3.1. Post Estimation Diagnostic Tests

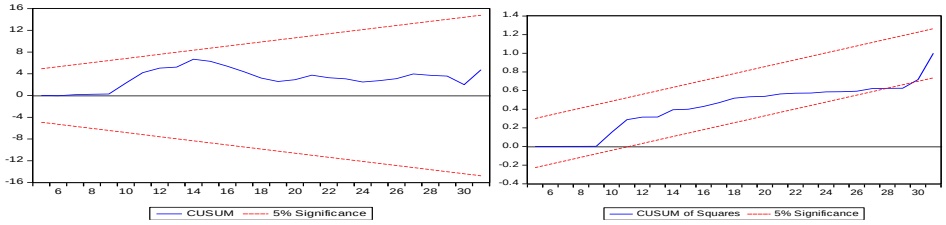
Table 7 below shows the Breusch-Godfrey Serial Correlation LM Test model result and revealed that the pro-Chi-Square value of 0.3072 is not significant at 5% level meaning that the null hypothesis of no Serial Correlation can be rejected; therefore, there is no problem of autocorrelation in the model variables.

Table 7. Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.828283	Prob. F (1,23)	0.3722
Obs*R-squared	1.042815	Prob. Chi-Square (1)	0.3072

Source: Author's Computation, 2022

Stability Diagnosis employed the use of both CUSUM and CUSUM of squares tests to determine the appropriateness and stability of the model for making long run decision as in figure 1 an 2 below. The results show with the blue line falling between and within the five per cent critical bound lines, indicating that the model parameters do not suffer from any structural instability over the period of study.



5. Conclusion and Policy Recommendations

This study investigated the effects and relationship between Public Infrastructures Investment and Macroeconomic Outcomes in Nigeria proxy by variables such as public capital expenditure, unemployment, interest and inflation rates, and income per capita and found that no causality between inflation rate and income per capita while capital expenditure has positive and but not significant impact on interest rate. Based on the findings in this study, there is dearth of long run relationship between Public Infrastructures Investment and Macroeconomic Outcomes in Nigeria. The study conclusion induces appropriate policy recommendations that government should;

1. Increase capital investment expenditure to infrastructural development in order to stimulate favorable macroeconomic outcomes.

2. Hence enhance economic performance through focused spending on specific public infrastructure (s) with more influence on the economy and welfare of Nigerians.

3. Improve on revenue generation strategies in order to have sufficient income for infrastructures development in Nigeria.

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