Effect of Foreign Direct Investment on Government Capital Expenditure in Nigeria

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ABSTRACT

Research purpose: The study examined the effect of foreign direct investment inflows, foreign direct investment outflows and remittance inflows on total government capital expenditure in Nigeria.

Methodology: The study adopted an *ex-post-facto* research design, covering a period of 54 years (1970 – 2023). Data collated from World Bank Database and CBN Statistical Bulletin were diagnosed and analysed using Auto regressive distributed lag (ARDL), ARDL cointegration models, and so on.

Findings: The results showed that all explanatory variables have non significant effects (individually) on total government capital expenditure at 5% level of significance both in the long and short runs. While foreign direct investment outflows (coeff. = -0.601, std. error = 2.034, t-stat = -0.295 and p-value = 0.769), exerted negative influence on the regressand, both foreign direct investment inflows (coeff. = 0.127, std. error = 0.880, t-stat = 0.144 and p-value = 0.886), and remittance inflows (coeff. =-0.308, std. error = 0.674, t-stat = 0.458 and p-value = 0.650), exerted positive influences on the same dependent variable, indicating that the short run coefficient on error correction term is CointEq (-1) = -0.302 and very statistically significant at the same 5% (p-value = 0.020.

Conclusion: It connotes a long run relationship among entered variables in the economy, i.e. the short run change from the long run equilibrium is corrected by 30.2% each year. The positive association between foreign direct investment inflows, remittance inflows and government capital expenditure imply enhancing the

operating environment and channels that facilitate significant increases in these predictors.

Keywords: *Foreign direct investment, capital inflows and outflows, capital expenditure*

1.0 INTRODUCTION

Foreign direct investment (FDI) as a growth accelerating component has received great attention in developed countries even in developing and less developed countries during recent years. It has been a matter of greater concern for the economists and financial analysts on how FDI affects the economic growth of the host country's economy. FDI is seen as the most important vehicle for international technological transfer and vital booster for maintaining a healthy economy (Odozi, 1995 in Adelegan 2000; Ajudua and Ojima, 2015; Abiola, 2019).

Multinational corporations strive to benefit from the most advanced technology available in the industry and their great resources can help them keep their position in the market by investing in research and development. Findlay (1978) postulates that FDI increases the rate of technical progress in the host country from the more advanced technology management practices used by foreign firms. Also, Wang and Wang and Blomstrom (1992) incorporated the idea into a model more in line with the neoclassical growth framework by assuming that the increase in knowledge applied to production is determined as a function of FDI.

Hodrab et al (2015) posits that FDI is viewed to be a significant driver for advancing the economic development of emerging economies of developing countries as well as for developed economies. In line with the views of Hodrab *et al,* Falki (2009) submit that foreign direct investment (FDI) is significant for economic growth in the developing countries because it affects the economic growth by stimulating domestic investment, capital formation expansion and also, enhancing the technology transfer in the host countries. Falki further explained that the effects of FDI on the host economy result in increased employment, enhanced productivity, boost in exports and transfer of technology.

Macaulay (2012) asserted that Nigeria's foreign investment can be traced back to the colonial era when the colonial masters had the intention of exploiting our resources

for the development of their economy. There was little investment by these colonial masters with the discovery of oil. Ever since, Nigeria's foreign investment has not been stable. The Nigerian governments have recognized the importance of FDI in enhancing economic growth and development and various strategies involving incentive policies, reforms and regulatory measure have been put in place to promote the inflow of FDI to the country (Umah, 2007).

Also important as the foreign direct investment is remittance inflows. Remittances provide a significant source of foreign exchange earnings that can be used to fund imports, making them a valuable tool for stabilizing balance of payment. By augmenting domestic investments, foreign direct investment directly or indirectly facilitates infrastructural growth in Nigeria through increased government capital expenditure. The adequacy of these infrastructure will improve the standard of living of Nigerians (Orji et al, 2018). In spite of the role of foreign direct investment in fostering economic growth and development in an economy, life in Nigeria has been a mix of daunting challenges and boundless opportunities. Yet with the seeming boundless opportunities through foreign direct investment and remittances, the country suffers. This has projected a bizarre image of west Africa specifically, Nigeria as a country with capital flight, capital sink and capital stagnancy due to high inflation, increased national insecurity, political instability, poor infrastructures and so on (Onyeiwu and Shrestha, 2004; World Bank, 2020; Orji et al, 2021; Ajala and Ejemezu, 2023).

Nigeria is Africa's largest economy and a major player in the global economy. But her huge infrastructure deficit has constrained economic growth and development, thus inhibiting her ability to improve the quality of life as envisaged by her governments at several levels. Nigeria's infrastructure is in a deplorable state and the nation's infrastructural needs are evident for all to see. Nigeria can boast of extensive infrastructure of roads, railroads, airports, and communication networks. Most developed nations in the world jump-started their economies by accelerating their infrastructure and building on it; examples being those of India and the United States of America.

Other than bad roads, dilapidated hospitals and schools also mirror the huge decline in infrastructural growth in Nigeria despite the huge funds coming into the country

from overseas. Consequently, the study examined the effect of foreign direct investment on total government capital expenditure in Nigeria as its effect on these capital expenditures remains unascertained.

2.0 REVIEW OF LITERATURE

2.1 Conceptual Review

Foreign direct investment (FDI) is seen by Onyeagu and Okeiyika (2013) as the most important vehicle for international technological transfer. Foreign direct investment (FDI) is perceived as one of the most important strategies for the promotion of economic growth and development in developing countries such as Nigeria. This is because FDI can serve as an important catalyst for growth (Olukemi, 2022) by increasing the opportunity for developing the countries integration into global financial and capital flows, expand employment and export base, generate technological capability-building and efficiency spillovers to local firms, as well as establish investment arrangements that increase the potential of host countries for economic growth (Olayiwola and Okodua, 2007).

Foreign direct investment net inflows are the value of inward direct investment made by a non-resident investor in the economy being reported. The inward direct investment, also referred to as direct investment, includes all liabilities and assets transferred between resident direct investment enterprises and their direct investors. Gbosi (2002) acknowledges Nigeria's efforts towards balance of payment maintenance, employment promotion and output growth through attraction of foreign direct investments. Gbosi further observed that the potential relevance attached to FDI inflows by nations invariably, informs the establishment of an international economic relations department in all Nigerian missions abroad whose primary responsibility is to inform all potential foreign investors about investment opportunities and prevailing incentives for any foreign direct investor in Nigeria.

Foreign direct investment net outflows encompass the value of outward direct investment made by the residents of the reporting economy to external economies. It includes assets and liabilities transferred between the resident direct investor and their direct investment enterprises. It also covers transfers of assets and liabilities between resident and non-resident enterprises. If the ultimate controlling parent is resident. Outward direct investment is also called direct investment abroad.

Remittances have become an important source of income for many developing countries. Ratha (2003) opined that remittances are not only used as a mechanism for the survival of the poor in developing countries but as a risk-sharing mechanism, a stable source of investment and for future consumption smoothing. Remittances by simple definition are transfers by migrants, who reside abroad, to their family members in their country of origin (Kihangire and Katarikawe, 2008).

Public expenditure, as seen by Aigheyisi (2013), includes all expenses incurred by a government for the maintenance of itself and the provision of goods and services to foster economic growth and improve the welfare of the people in the society. Through the provision of social amenities, the government reaches out to its citizens for them to make a living hence, enhancing the growth of the economy. Government expenditure can generally be categorized into capital and recurrent expenditure. Capital expenditure refers to the amount spent in the acquisition of non-current (productive) assets (whose useful life extends beyond the accounting or fiscal year), as well as expenditure incurred in the upgrade/improvement of existing non-current assets such as lands, buildings, roads, machines and equipment, among others., including intangible assets.

2.2 Theoretical Framework

This study is anchored on the following theories: *Capital Market Theory by Markowitz (1956) and Gravity Approach to Foreign Direct Investment theory by Jan Tinbergen (1962).* The capital market theory is positive in that it hypothesizes how investors do behave rather than how investors should behave, as in the case of Modern Portfolio Theory (MPT). It is reasonable to view capital market theory; as an extension of portfolio theory, but it is important to understand that MPT is not based on the validity, or lack thereof, of capital market theory. The capital market theory involves a set of predictions concerning equilibrium expected return on risky assets. It typically is derived by making some simplifying assumptions to facilitate the analysis and help us to understand the arguments without fundamentally changing the predictions of asset pricing theory. The capital market theory builds on Markowitz portfolio theory to diversify his or; her portfolio, according to the Markowitz model, choosing a location on the efficient frontier that matches his or her return-risk references.

The gravity model of international trade in international economics, similar to other gravity models in social science, predicts bilateral trade flows based on the economic sizes (often using GDP measurements) and distance between two units. The model was first used by Jan Tinbergen in 1962. The model has been used by economists to analyze the determinants of bilateral trade flows such as common borders, common languages, common legal systems, common currencies, common colonial legacies, and it has been used to test the effectiveness of trade agreements between organizations (Lude and Therese, 2020). The model has been an empirical success in that it accurately predicts trade flows between countries for many goods and services, but for a long time, some scholars believed that there was no theoretical justification for the gravity equation. However, a gravity relationship can arise in almost any trade model that includes trade costs with increasing distance.

In summary, capital market theory stresses that the level of FDI that flows to a country is a function of the prevailing interest rate in the country and changes in the macroeconomic environment. However, the gravity approach to FDI theory is of the view that the level of FDI flows between countries will be a function of how close these countries are to each other. Put differently, the closer (geographically, economically, and culturally) two countries are, the more the flow of FDI between them hence the study is anchored on the gravity approach to FDI.

2.3 Empirical Review

In trying to evaluate the relationship between foreign direct investment and economic growth in Pakistan, Ahmed et al (2012) found from their correlation analysis results that there is a positive relationship between foreign direct investment and gross domestic product in short as well as long run. Jibir and Abdu (2017) examined the paradigm 'FDI led growth' using a dataset for Nigeria obtained from the Central Bank of Nigeria span between 1970 and 2014. Modern econometric tools of the Vector error correction model and Granger Wald test were employed. The econometric analysis reveals that there is a steady long-run relationship between FDI and output in Nigeria. Additionally, the causality result indicates that there is unidirectional causality between trade openness and per capita income, running from trade openness to per capita income proxy for economic growth. Uwaezuoke et al (2018) examined the causal relation between FDI and government expenditure in Nigeria for the period

1970-2016. They used OLS and revealed that FDI exerted strong influence on government capital expenditure in both pre- and post-deregulation periods.

Okegbe et al (2019) evaluated the extent to which Foreign Direct Investment (FDI) has contributed to the Gross Domestic Product (GDP) in Nigeria from 2000 to 2017. Regression analysis technique was adopted with the aid of E-views 9.0. The study revealed that foreign direct investment in the financial sector, oil sector, and non-oil sector has a positive and significant effect on the Gross Domestic Product in Nigeria. Adekunle et al (2019) examined the effect of Foreign Direct Investment (FDI), exchange rate and energy infrastructure on domestic investment in Nigeria. Time series data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and World Development Indicator were employed using the Autoregressive Distributed Lag (ARDL) Model. Empirical findings show that FDI has a positive and significant effect on domestic investment while exchange rate and energy infrastructure have a positive effect on domestic investment but non-significant.

Giwa et al (2020) examined the effect of FDI inflows into Nigeria on real gross domestic product (RGDP) growth. The model constructed was estimated using the robust GMM estimation technique which took care of the problem of endogeneity and autocorrelation inherent in ordinary least squares. The study found that labour quality has a positive and significant effect on RGDP in line with theory. Equally, it was noted that capital intensity displayed a significant negative effect on RGDP in Nigeria. Okwu et al (2020) analysed the effects of foreign direct investment (FDI) inflows on the economic growth of 30 leading global economies during the period between 1998 and 2017. Other variables considered in the analysis were domestic credit to the private sector (DCPS), gross fixed capital formation (GFCF), inflation–consumer prices index (INFPC), trade openness (TOPNESS), and youth unemployment (UEMPYT). The results showed mixed growth effects of the variables in general. Specifically, FDI exerted a positive and significant effect on the economic growth of the countries during the period.

Yusuf et al (2020) examined the role of financial development, FDI, democracy and political instability on economic growth in West Africa. The study uses the dynamic fixed effects technique on the secondary data obtained from 1996 to 2016. Using correlation analysis, empirical findings suggest that even though no significant

relationship is established in the short run, the long-run coefficient of FDI is found to be significant and positive; a 1% increase in FDI inflow into the West African sub-region results in a 0.26% increase in economic growth. The coefficient of democracy is significant neither in the short run nor in the long run, but political instability is found to significantly and negatively impact the growth of the countries.

Adejumo (2013) examined the relationship between foreign direct investment and the value added to the manufacturing industry in Nigeria for the period 1970 to 2009. Using the autoregressive lag distribution technique, the study observed that foreign direct investments harmed the manufacturing sub-sector in Nigeria in the long run. Adegboye et al (2016) examined the relationship between foreign direct investment and industrial performance in selected African countries over the period 1996 to 2015. The study employed pooled ordinary least square technique and fixed effect least-square dummy variable model. The result of the study showed that foreign direct investment had a significant impact on the industrial sector.

Nwosa (2018) examined the role of foreign direct investment in industrial sector growth in Nigeria for the period spanning 1970 to 2016. The study utilised the error correction modelling technique and the result of the study showed that foreign direct investment had a negative and significant impact on industrialization in Nigeria. The study concluded that the role of foreign direct investment in the growth of the Nigerian industrial sector had been harmful rather than enhancing it. Adegboye et al (2020) examined the effect of institutions' challenges on the FDI inflow and how it impacts on economic development for 30 host selected countries in sub-Saharan Africa (SSA) for the period 2000 to 2018. Using panel least squares, the study reveals that foreign capital inflow is crucial for economic development in the SSA sub-region of Africa. Quality of institutions as determining factors also affected the level of inflow of FDI to the host SSA sub-region, which resulted in the underutilization of domestic resources.

Chowdhury and Anuradha (2021) examined the two-way relationship between FDI inflow and exchange rate in India. Employing diagnostic tests and Granger Causality test, the study showed that FDI has no significant causality on exchange rate. However, exchange rate exerted significant causality on FDI. Meyer and Shera (2017) examined the economic growth effect of remittances in six (6) countries; Bulgaria,

Albania, Moldova, Macedonia, Romania, and Bosnia Herzegovina between the period 1999 and 2013 using multiple regression techniques and noted that remittances exert a positive effect on economic growth.

Anetor (2019) examine the relationship between remittances, financial sector development, and economic growth in Nigeria over the period 1981 to 2017. The study used the autoregressive distributed lag (ARDL) model to analyze the long-run and short-run relationships between the variables. The results showed that remittances have a negative and significant effect on economic growth both in the long-run and short-run. The study also established that financial sector development has a negative and significant impact on economic growth both in the long-run and short-run.

Olukemi (2022) looked at the relationship between foreign direct investment and capital formation in the local economy. Employing such diagnostic tests as augmented Dickey Fuller, exchange rate, gross domestic product, capital formation and government expenditure (GE) contain no unit roots at I(1) while inflation and interest rates are stationary at I(0). The autoregressive distributive lag model (ARDL) depicted a significant positive effect of FDI, GDP, interest rate and GE on capital formation. Syukri et al (2022) investigated the influence of corruption, private wages, economic growth and GE on FDI in Indonesia. All entered exogenous variables excluding wages (negative) exerted significant positive effect on FDI for the study period 2000-2020.

Orji et al (2021) studied the relation between FDI and economic growth in Nigeria for the period 1981-2017. Applying diagnostics, ARDL and OLS models, the study revealed a significant positive association between FDI and real GDP. Ajala and Ejemezu (2023) examined the association between national security and FDI in Nigeria for the period 2005-2021. Employing ARDL on the variables studied showed that GE (internal and external defense) affected FDI positively and significantly.

3.0 METHODOLOGY

The study employed an ex-post facto research design. It was carried out in Nigeria using a 54-year (1970-2023) time series data set extracted from the Central Bank of Nigeria Statistical Bulletin and World Bank Database. The population of the study centered on the revenue sources such as exports, taxation, oil revenue, non-oil revenue, FDI inflows, and remittances, among others. Auto regressive distributive lag (ARDL) and ARDL cointegration models were used to analyze the data set after

carrying out necessary diagnostic tests. These models also solve such problems as autocorrelation, heteroskedasticity, endogeneity and so on. The ARDL (p, q) model specification is given as follows: $A(L)y_t = \mu + B(L)x_t + \mu_t$ where

$A(L) = 1 - \alpha_1 L - \alpha_2 L^2 - \ldots - \alpha_p L^p$ $B(L) = 1 - \beta_1 L - \beta_2 L^2 - \ldots - \beta_p L^p$

Therefore, the ARDL ($p, q_1, q_2, \ldots, q_k$) model specification becomes

$$A(L)y_t = \mu + B_1(L)x_{1t} + B_2(L)x_{2t} + \ldots + B_k(L)x_{kt} + \mu_t$$

L is a lag operator such that $L^0 y_t = y_t$, $L^1 y_t = y_{t-1}, \ldots$

y_t and x_t are stationary variables.

u_t is a white noise.

μ is intercept term.

t = Current period t-1 = lagged or previous period

4.0 RESULTS

tgcetgdp = total government capital expenditure deflated by GDP

fdiitgdp = Foreign direct investment inflows deflated by GDP

fdiotgdp = Foreign direct investment outflows deflated by GDP

rmtitgdp = Remittance inflows deflated by GDP

Table 1: Descriptive Statistics and Normality Tests

Var.	*Obs.*	*Mean*	*Std. Dev.*	*Std. Err.*	*Pr (Skew)*	*Pr (Kurt)*	*Joint Pr>Chi²*	*Shapiro W Pr>Z*	*Shapiro F Pr>Z*	*Min*	*Max*
tgcetgdp	53	.0585	.0608	.0084	.0000	.0010	.0000	.0000	.0000	.0064	.2877
fdiitgdp	53	.0142	.0122	.0017	.0002	.0038	.0002	.0001	.0002	-.0115	.0579
fdiotgdp	53	.0027	.0042	.0006	.0000	.0001	.0000	.0000	.0000	0	.0192
rmtitgdp	53	.0094	.0120	.0016	.0000	.0040	.0000	.0000	.0000	0	.0505

Source: Authors' STATA 14.2 Outputs

The figures in table 1 depicted the mean as an approximate measure of the true population. Standard errors indicate that all data sets are very small in comparison to their respective means, given that means, standard deviations and standard errors exist in the same metrics. Specifically, the standard errors are quite small and aligned to the theory that it becomes smaller as a normal sample approaches the universal set. However, the standard deviations of the same variables seemed to be larger than their respective means, excluding foreign direct investment inflows deflated by GDP (fdiitgdp). This confirmed its vulnerability to extreme values and existence of extreme values in the data set. Further, the probabilities of skewness, kurtosis, joint (both moments), Shapiro-Wilk W and Shapiro-Francia W for the all entered variables are below 0.1%. The range (.2813, .0694, .0192, .0505) is undulating for the relevant period. In other words, these values are therefore normally distributed.

Table 2: Stationarity Tests

Null Hypothesis: Unit root (individual unit root process)
Series: TGCETGDP, FDIITGDP, FDIOTGDP,
RMTITGDP
Date: 03/16/24 Time: 09:33
Sample: 1970 2023
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 4
Total number of observations: 199
Cross-sections included: 4

Method	Statistic	Prob.**
ADF - Fisher Chi-square	163.836	0.0000
ADF - Choi Z-stat	-11.8647	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi

-square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(UNTITLED)

Series	Prob.	Lag	Max Lag	Obs
D(TGCETGDP)	0.0000	0	10	51
D(FDIITGDP)	0.0000	0	10	51
D(FDIOTGDP)	0.0000	1	10	50
D(RMTITGDP)	0.0000	4	10	47

Source: Authors' EVIEWS 10.0 Outputs

The Fisher-type unit root test conducted revealed that all the variables are stationary (contain no unit roots as all p-values = 0.0000 i.e. accepting the alternative hypothesis, Ha). Further, a common stationarity test (probabilities of both ADF-Fisher Chi-square and ADF-Choi Z-stat are 0.0000) confirmed the group has no unit root.

Table 3: Cointegration Tests

Date: 03/16/24 Time: 10:11
Sample (adjusted): 1972 2022
Included observations: 51 after adjustments
Trend assumption: Linear deterministic trend
Series: TGCETGDP FDIITGDP FDIOTGDP
RMTITGDP
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.300451	43.62064	47.85613	0.1182
At most 1	0.256406	25.39737	29.79707	0.1477
At most 2	0.137907	10.28812	15.49471	0.2592
At most 3	0.051939	2.720135	3.841466	0.0991

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.300451	18.22327	27.58434	0.4766
At most 1	0.256406	15.10924	21.13162	0.2813
At most 2	0.137907	7.567989	14.26460	0.4243
At most 3	0.051939	2.720135	3.841466	0.0991

Max-eigenvalue test indicates no cointegration at the 0.05 level
Source: Authors' EVIEWS 10.0 Outputs

The Johanson cointegration tests carried out above indicated no cointegration of entered variables at $\alpha = 0.05$ level of significance. As regards unrestricted cointegration rank test, both the *trace* and *maximum-eigenvalue* statistics depicted values

below the corresponding critical values. Also, the p-values are all above $\alpha = 0.05$; hence, Ho is commonly accepted.

The LM test for autoregressive conditional heteroskedasticity (ARCH) suggested a P-value > chi2 = 0.0062. The null hypothesis of this test is such that the standard deviation of the data over the period is statistically constant (no ARCH effects). The significant result suggests that the null hypothesis be rejected and the alternative is held. Thus, the data has a heteroskedasticity problem (ARCH (ρ) disturbance). For consistency, accuracy and validity, Breusch-Pagan-Godfrey heteroskedasticity test indicated F-statistic = 2.27 and Prob. F(10, 38) = 0.0339. The null hypothesis that the residuals are homoskedastic is rejected confirming the above. Also, the result of the multicollinearity test suggests VIFs values of between 1.29 to 1.79 for all the explanatory variables and a mean of 1.54. The above outcome suggested that the data is free from multicollinearity issues because all the value is significantly closer to 1 than 10. Further, the Durbin-Watson statistics show a serious serial-autocorrelation with values 0.6965 which is far less than 2. This outcome is corrected by adjusting the Durbin-Watson statistic during regression. This is revealed by both Breusch-Godfrey LM and Durbin's alternative tests for autocorrelation (Prob. > Chi^2 = 0.0000, see Appendix III). The Breusch-Godfrey serial correlation LM test also showed F-statistic = 1.12 and Prob. F(2, 36) = 0.338. That is, Ho (residuals are serially uncorrelated) is accepted indicating absence of serial autocorrelation after correction.

Hypothetical Tests (Null Form, All variables deflated by GDP)

i) Foreign direct investment inflows exert a non-significant effect on total government capital expenditure.
ii) Foreign direct investment outflows exert a nonsignificant effect on total government capital expenditure.
iii) Remittance inflows exert a non-significant effect on total government capital expenditure.

Table 4: Least Squares Tests

ARDL Cointegrating And Long Run Form
Dependent Variable: TGCETGDP
Selected Model: ARDL(4, 1, 0, 2)

Date: 03/16/24 Time: 12:59
Sample: 1970 2023
Included observations: 49

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TGCETGDP(-1))	-0.297089	0.166800	-1.781107	0.0829
D(TGCETGDP(-2))	0.159499	0.170639	0.934716	0.3558
D(TGCETGDP(-3))	0.288884	0.145480	1.985736	0.0543
D(FDIITGDP)	0.126601	0.880202	0.143831	0.8864
D(FDIOTGDP)	-0.600929	2.033654	-0.295492	0.7692
D(RMTITGDP)	0.308306	0.673702	0.457630	0.6498
D(RMTITGDP(-1))	1.080899	0.616585	1.753040	0.0877
CointEq(-1)	-0.301856	0.123855	-2.437174	0.0196

Cointeq = TGCETGDP - (3.5945*FDIITGDP
-1.9908*FDIOTGDP -5.3942
*RMTITGDP + 0.0663)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.

FDIITGDP	3.594498	3.487343	1.030727	0.3092
FDIOTGDP	-1.990783	6.695815	-0.297317	0.7678
RMTITGDP	-5.394151	2.761532	-1.953318	0.0582
C	0.066269	0.034726	1.908323	0.0639

Source: Authors' EVIEWS 10.0 Outputs

The presence of long run association among the entered variables is examined using as endogenous each variable of the model and exogenous the same variable(s). Test is used with F-statistic, an asymptotic distribution, matched with critical bounds. The measurement of bounds on ARDL tests is sensitive in the selection of lag length; the latter for each variable in an ARDL model is important to avoid the non-normality, serial autocorrelation, multicollinearity and heteroscedasticity. To determine the optimal lag in each variable for a long run relationship, we use the Hannan-Quinn Criterion (HQC), Akaike Information Criterion (AIC) or Schwarz Bayesian Criterion (SBC). ARDL model is estimated with variables in their levels. We transformed the model's variables in first differences to become stationary and avoid spurious regression. This may be solved but the first order equation provides only the short run relationship among variables. As the long run relationship is more vital, cointegration and the error correction model were examined connecting the short and long run relationship of the variables of the model. The ECM term is derived from cointegration models. The coefficient λ of ECM is the short run adjustment coefficient denoting the speed of adjustment. The sign of λ coefficient is negative and varies from 0 to 1.

The results of table 4 showed that all explanatory variables have non significant effects (individually) on total government capital expenditure at 5% level of significance in the short run. While foreign direct investment outflows (coeff. = -0.601, std. error = 2.034, t-stat = -0.295 and p-value = 0.769), exerted negative influence on the regressand, both foreign direct investment inflows (coeff. = 0.127, std. error = 0.880, t-stat = 0.144 and p-value = 0.886), and remittance inflows (coeff. =-0.308, std. error = 0.674, t-stat = 0.458 and p-value = 0.650), exerted positive influences on the same dependent variable.

The above results, further, indicate that the short run coefficient on error correction term is CointEq (-1) = -0.302 and very statistically significant at the same 5% (p-value = 0.020. It connotes a long run relationship among entered variables in the economy, i.e. the short run change from the long run equilibrium is corrected by 30.2% each year. The long run results also depicted nonsignificant effect of all variables on tgcetgdp. That is, the results for both short and long runs are similar. However, the F-statistic = 8.041 and p-value = 0.000 proved that the collective influence of the explanatory variables on the predicted is very strong statistically.

5.0 CONCLUSION

The results of this study have proven that all explanatory variables exhibited nonsignificant effects on total government capital expenditure in Nigeria. The results for both short and long runs are similar and aligned to findings of Yusuf et al (2020). The R-squared indicated that 68% of changes in total government capital expenditure is influenced jointly by the predictors. The positive association between foreign direct investment inflows, remittance inflows and government capital expenditure imply enhancing the operating environment and channels that facilitate significant increases in these predictors.

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APPENDIX I: RAW DATA SET

YEAR	TGCE(₦B)	FDII($B)	RATE(N:$)	GDP($B)	FDIO($B)	REMIT($B)
1970	0.188	0.21	0.714	12.55		
1971	0.174	0.29	0.713	9.18		
1972	0.451	0.31	0.658	12.27		
1973	0.566	0.37	0.658	15.16		
1974	1.22	0.26	0.63	24.85		
1975	3.21	0.47	0.616	27.78		
1976	4.04	0.34	0.627	36.31		
1977	5.01	0.44	0.645	36.04	0	0.056
1978	5.2	0.21	0.635	36.53	0	0.0086
1979	4.22	0.31	0.6	47.26	0.005	0.0175
1980	10.16	-0.74	0.55	64.2	0.0046	0.0342
1981	6.57	0.54	0.618	164.48	0.008	0.0098
1982	6.42	0.43	0.673	142.77	0	0.0125
1983	4.89	0.36	0.724	97.09	0.001	0.0142
1984	4.1	0.19	0.767	73.48	0.002	0.016
1985	5.46	0.49	0.894	73.75	0.0019	0.0137
1986	8.53	0.19	2.02	54.81	0.0144	0.0073
1987	6.37	0.61	4.02	52.68	0	0.0052
1988	8.34	0.38	4.54	49.65	0.0051	0.0049
1989	15.03	1.88	7.39	44	0.798	0.0231
1990	24.05	0.59	8.04	54.04	0.415	0.0185
1991	28.34	0.71	9.91	49.12	0.412	0.11
1992	39.76	0.9	17.3	47.79	0.26	0.108
1993	54.5	1.35	22.05	27.75	0.533	1.4
1994	70.92	1.96	21.89	33.83	0.328	0.684
1995	121.14	0.34	81.2	44.06	0.192	0.177
1996	212.93	0.5	81.2	51.08	0.597	0.16
1997	269.65	0.47	82	54.46	0.103	0.292
1998	309.02	0.3	84	54.6	0.159	0.2

1999	498.03	1	93.95	59.37	0.173	2.2
2000	239.45	1.14	102.1	69.45	0.169	2.01
2001	438.7	1.19	111.93	74.03	0.094	1.59
2002	321.38	1.87	121	95.05	0.172	1.27
2003	241.69	2.01	129.3	104.74	0.167	1.01
2004	351.25	1.87	133.5	135.76	0	1.67
2005	519.47	4.98	131.1	175.67	0.015	8.33
2006	552.39	4.85	129	238.45	0.32	7.1
2007	759.28	6.04	126	278.26	1.53	6.47
2008	960.89	8.19	119	339.48	1.05	5.66
2009	1,152.80	8.56	149	295.01	1.53	6.23
2010	883.87	6.03	150	366.99	0.912	5.38
2011	918.55	8.84	153.9	414.47	0.818	4.97
2012	874.7	7.07	157.5	463.97	1.53	4.43
2013	1,108.39	5.56	157.3	520.12	1.23	4
2014	783.12	4.69	158.6	574.18	1.61	3.66
2015	818.35	3.06	192.4	493.03	1.44	4.18
2016	653.61	3.45	253.5	404.65	0.335	4.87
2017	1,242.30	2.41	305.8	375.75	0.311	5.86
2018	1,682.10	0.78	306.1	421.74	0.566	5.76
2019	2,289.00	2.31	306.9	474.52	0.285	5.02
2020	1,614.89	2.39	358.8	432.2	1.47	3.98
2021	2,522.47	3.31	401.2	440.83	1.82	4.42
2022	3,133.82	-0.19	426	477.39	0	4.26

APPENDIX II: PROCESSED DATA SET

YEAR	*TGCETGDP*	*FDIITGDP*	*FDIOTGDP*	*RMTITGDP*

1970	0.0209805	0.016733	0	0
1971	0.0265838	0.0315904	0	0
1972	0.0558607	0.0252649	0	0
1973	0.0567403	0.0244063	0	0
1974	0.0781834	0.0104628	0	0
1975	0.1874655	0.016918	0	0
1976	0.1774987	0.0093638	0	0
1977	0.2153077	0.0122087	0	0.0015538
1978	0.2241713	0.0057487	0	0.0002354
1979	0.1488221	0.0065595	0.0001058	0.0003703
1980	0.2877372	-0.011526	5	7.165E-05	0.0005327
1981	0.0646344	0.0032831	4.864E-05	5.958E-05
1982	0.0668164	0.0030118	0	8.755E-05
1983	0.0695658	0.0037079	1.03E-05	0.0001463
1984	0.0727477	0.0025857	2.722E-05	0.0002177
1985	0.082812	0.0066441	2.576E-05	0.0001858

1986	0.0770438	0.0034665	0.0002627	0.0001332
1987	0.0300793	0.0115793	0	9.871E-05
1988	0.0369991	0.0076536	0.0001027	9.869E-05
1989	0.0462234	0.0427273	0.0181364	0.000525
1990	0.0553533	0.0109178	0.0076795	0.0003423
1991	0.0582194	0.0144544	0.0083876	0.0022394
1992	0.0480909	0.0188324	0.0054405	0.0022599
1993	0.0890687	0.0486486	0.0192072	0.0504505
1994	0.0957681	0.0579367	0.0096955	0.0202187
1995	0.03386	0.0077167	0.0043577	0.0040172
1996	0.0513369	0.0097886	0.0116875	0.0031323
1997	0.0603822	0.0086302	0.0018913	0.0053617
1998	0.0673775	0.0054945	0.0029121	0.003663
1999	0.0892877	0.0168435	0.0029139	0.0370558
2000	0.0337689	0.0164147	0.0024334	0.0289417
2001	0.0529436	0.0160746	0.0012698	0.0214778

2002	0.027943	0.019673	0.001809	0.013361
2003	0.017846	0.019190	0.001594	0.009642
2004	0.019380	0.013774	0	0.012301
2005	0.022555	0.028348	8.539E-05	0.047418
2006	0.017958	0.020339	0.001342	0.029775
2007	0.021656	0.021706	0.005498	0.023251
2008	0.023785	0.024125	0.003093	0.016672
2009	0.026225	0.029016	0.005186	0.021117
2010	0.016056	0.016431	0.002485	0.014659
2011	0.014400	0.021328	0.001973	0.011991
2012	0.011969	0.015238	0.003297	0.009548
2013	0.013547	0.010698	0.002364	0.007690
2014	0.008599	0.008168	0.002804	0.006374
2015	0.008627	0.006206	0.002920	0.008478
2016	0.006371	0.008525	0.000827	0.012035
2017	0.010811	0.006413	0.000827	0.015595

2018	0.01303	0.0018495	0.00134 21	0.013657 7
2019	0.015717 9	0.0048 681	0.0006 006	0.01057 91
2020	0.01041 37	0.0055 298	0.00340 12	0.00920 87
2021	0.01426 24	0.0075 086	0.00412 86	0.01002 65
2022	0.01540 96	-0.000 398	0	0.00892 35

APPENDIX III: SOFTWARE RESULTS

```
. summarize
```

Variable	Obs	Mean	Std. Dev.	Min	Max
year	53	1996	15.44345	1970	2022
tgcetgdp	53	.0584585	.0608438	.0063718	.2877372
fdiitgdp	53	.0142014	.0121836	-.0115265	.0579367
fdiotgdp	53	.002684	.0041652	0	.0192072
rmtitgdp	53	.0093531	.011983	0	.0504505

```
. mean tgcetgdp fdiitgdp fdiotgdp rmtitgdp
```

Mean estimation Number of obs = 53

	Mean	Std. Err.	[95% Conf.	Interval]
tgcetgdp	.0584585	.0083575	.0416879	.0752291
fdiitgdp	.0142014	.0016735	.0108432	.0175596
fdiotgdp	.002684	.0005721	.0015359	.003832
rmtitgdp	.0093531	.001646	.0060502	.012656

. sktest tgcetgdp fdiitgdp fdiotgdp rmtitgdp

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	joint Prob>chi2
tgcetgdp	53	0.0000	0.0010	24.41	0.0000
fdiitgdp	53	0.0002	0.0038	16.94	0.0002
fdiotgdp	53	0.0000	0.0001	32.00	0.0000
rmtitgdp	53	0.0000	0.0040	20.07	0.0000

. swilk tgcetgdp fdiitgdp fdiotgdp rmtitgdp

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
tgcetgdp	53	0.74501	12.557	5.415	0.00000
fdiitgdp	53	0.88920	5.456	3.631	0.00014
fdiotgdp	53	0.67594	15.958	5.928	0.00000
rmtitgdp	53	0.76990	11.331	5.195	0.00000

. sfrancia tgcetgdp fdiitgdp fdiotgdp rmtitgdp

Shapiro-Francia W test for normal data

Variable	Obs	W'	V'	z	Prob>z
tgcetgdp	53	0.74105	14.056	4.800	0.00001
fdiitgdp	53	0.87901	6.568	3.489	0.00024
fdiotgdp	53	0.71834	15.289	4.942	0.00001
rmtitgdp	53	0.80391	10.644	4.328	0.00001

Date: 03/16/24 Time: 10:11

Sample (adjusted): 1972 2022

Included observations: 51 after adjustments

Trend assumption: Linear deterministic trend

Series: TGCETGDP FDIITGDP FDIOTGDP

RMTITGDP

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**

None	0.300451	43.62064	47.85613	0.1182
At most 1	0.256406	25.39737	29.79707	0.1477
At most 2	0.137907	10.28812	15.49471	0.2592
At most 3	0.051939	2.720135	3.841466	0.0991

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.300451	18.22327	27.58434	0.4766
At most 1	0.256406	15.10924	21.13162	0.2813
At most 2	0.137907	7.567989	14.26460	0.4243
At most 3	0.051939	2.720135	3.841466	0.0991

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

```
. tsset year
        time variable:  year, 1970 to 2022
                delta:  1 unit

. estat archlm, lags(2)
LM test for autoregressive conditional heteroskedasticity (ARCH)
```

lags(*p*)	chi2	df	Prob > chi2
2	10.182	2	0.0062

H0: no ARCH effects *vs.* H1: ARCH(*p*) disturbance

```
. estat bgodfrey, lags(2)

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
2	25.355	2	0.0000

H0: no serial correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.117105	Prob. F(2,36)	0.3383
Obs*R-squared	2.863307	Prob. Chi-Square(2)	0.2389

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.267651	Prob. F(10,38)	0.0339
Obs*R-squared	18.31267	Prob. Chi-Square(10)	0.0499
Scaled explained SS	29.00269	Prob. Chi-Square(10)	0.0012

Dependent Variable: TGCETGDP
Method: ARDL
Date: 03/16/24 Time: 10:29
Sample (adjusted): 1974 2022
Included observations: 49 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): FDIITGDP FDI RMTITGDP
Fixed regressors: C
Number of models evalulated: 500
Selected Model: ARDL(4, 1, 0, 2)

Variable	Coefficient	Std. Error	t-Statistic
TGCETGDP(-1)	0.401055	0.150789	2.659720
TGCETGDP(-2)	0.456588	0.162854	2.803659
TGCETGDP(-3)	0.129385	0.163721	0.790278
TGCETGDP(-4)	-0.288884	0.145480	-1.985736
FDIITGDP	0.126601	0.880202	0.143831
FDIITGDP(-1)	0.958419	0.663830	1.443771
FDIOTGDP	-0.600929	2.033654	-0.295492
RMTITGDP	0.308306	0.673702	0.457630
RMTITGDP(-1)	-0.855661	0.756261	-1.131436
RMTITGDP(-2)	-1.080899	0.616585	-1.753040
C	0.020004	0.015201	1.315928

R-squared	0.679073	Mean dependent var	0.

Adjusted R-squared	0.594619	S.D. dependent var	c
S.E. of regression	0.040054	Akaike info criterion	-3
Sum squared resid	0.060964	Schwarz criterion	-
Log likelihood	94.35983	Hannan-Quinn criter.	-
F-statistic	8.040709	Durbin-Watson stat	2.
Prob(F-statistic)	0.000001		

*Note: p-values and any subsequent tests do not acc model selection.

ARDL Cointegrating And Long Run Form
Dependent Variable: TGCETGDP
Selected Model: ARDL(4, 1, 0, 2)
Date: 03/16/24 Time: 12:59
Sample: 1970 2023
Included observations: 49

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TGCETGDP(-1))	-0.297089	0.166800	-1.781107	0.0829
D(TGCETGDP(-2))	0.159499	0.170639	0.934716	0.3558
D(TGCETGDP(-3))	0.288884	0.145480	1.985736	0.0543

D(FDIITGDP)	0.126601	0.880202	0.143831	0.8864
D(FDIOTGDP)	-0.600929	2.033654	-0.295492	0.7692
D(RMTITGDP)	0.308306	0.673702	0.457630	0.6498
D(RMTITGDP(-1))	1.080899	0.616585	1.753040	0.0877
CointEq(-1)	-0.301856	0.123855	-2.437174	0.0196

Cointeq = TGCETGDP - (3.5945*FDIITGDP
-1.9908*FDIOTGDP -5.3942
*RMTITGDP + 0.0663)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDIITGDP	3.594498	3.487343	1.030727	0.3092
FDIOTGDP	-1.990783	6.695815	-0.297317	0.7678
RMTITGDP	-5.394151	2.761532	-1.953318	0.0582
C	0.066269	0.034726	1.908323	0.0639

ARDL Bounds Test
Date: 03/16/24 Time: 13:06
Sample: 1974 2022
Included observations: 49
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	3.323357	3

Critical Value Bounds

Significance	Io Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Dependent Variable: TGCETGDP
Method: Least Squares
Date: 03/16/24 Time: 13:28
Sample (adjusted): 1970 2022
Included observations: 53 after adjustments
HAC standard errors & covariance (Bartlett kernel,
Newey-West fixed
bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDIITGDP	-0.272320	1.327529	-0.205133	0.8383
FDIOTGDP	-0.000882	2.195453	-0.000402	0.9997
RMTITGDP	-1.174412	0.824775	-1.423918	0.1608
C	0.073313	0.027781	2.638987	0.0111

R-squared	0.068444	Mean dependent var	0.058458
Adjusted R-squared	0.011410	S.D. dependent var	0.060844
S.E. of regression	0.060496	Akaike info criterion	-2.700018
Sum squared resid	0.179327	Schwarz criterion	-2.551317
Log likelihood	75.55048	Hannan-Quinn criter.	-2.642835
F-statistic	1.200049	Durbin-Watson stat	0.696473
Prob(F-statistic)	0.319600	Wald F-statistic	1.420990
Prob(Wald F-statistic)	0.247898		