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THE IMPACT OF FOREIGN DIRECT INVESTMENT AND OIL REVENUE ON ECONOMIC GROWTH IN NIGERIA

Charles O. Manasseh
Department of Banking & Finance, University of Nigeria - Enugu Campus, Nigeria
Email: charssille@gmail.com

Ifeoma C. Nwakoby
Department of Banking & Finance, University of Nigeria - Enugu Campus, Nigeria
Email: ifeoma.nwakoby@unn.edu.ng

Ogochukwu C. Okanya*
Department of Banking and Finance, Institute of Management and Technology, Enugu, Nigeria
Email: ookanya@imt.edu.ng

Chuka U. Ifediora
Department of Marketing, University of Nigeria - Enugu Campus, Nigeria
Email: chuka.ifediora@unn.edu.ng

Williams A. Nzidee
Department of Economics, Ignatius Ajuru University of Education, Port Harcourt, Nigeria
Email: nzidee.williams@yahoo.com

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Abstract: Many emerging economies, particularly oil-rich countries such as Nigeria, have neglected the key drivers of growth, and consequently resulting in a decline in investment and employment. In the midst of this, the current study sought to examine the extent to which foreign direct investment and oil revenue impact Nigerian economic growth. The estimation was done using ordinary least squares (OLS) techniques, and the Granger causality test was used to determine the direction of causality between FDI, oil revenue, and economic growth using annual time series data from 1991 to 2019. Hence, recognising that annual time series are high-frequency data, all the variables were subjected to OLS assumptions. The empirical findings revealed that FDI and oil revenue significantly impacted growth. Accounting for the impact of economic activities reflected in the role of financial inflow and outflow on economic growth, a significant and positive relationship was found. This implies that

* Corresponding author: Ogochukwu C. Okanya. *E-mail: ookanya@imt.edu.ng*

international monetary transactions between entities captured in the current account balance are key determinants of growth in Nigeria. Further evidence revealed that variables such as real exchange rate, inflation and interest rates significantly determine economic growth in Nigeria. As such, this finding was further supported by their interactive effects, revealing an inverse and significant influence on economic growth. The Granger causality results show bidirectional causality between oil revenue and growth, as well as between oil revenue and foreign direct investment in Nigeria. The robustness test, which employs GDP per capita and GDP growth as proxies for economic growth, is consistent with empirical evidence. As a result, FDI and oil revenues are important drivers of Nigeria's growth, ceteris paribus.

Keywords: FDI; Oil Revenue; Economic Growth.

JEL codes: E20, H27, O4.

1. Introduction

The interdependence of the world's economies makes the expanding webs of international connections necessary. These relationships are the most visible aspects of today's global discourse, which is based on a conscious drive and cross-border investments by Multinational Corporations-MNCs (Ayanwale, 2007, Manh & Terukazu, 2005). It has been claimed that carefully considered investment-induced policies have a major impact on economic growth (Awolusi et al., 2017). FDI is an investment undertaken to obtain a long-term managerial interest that has attracted around 10% of the voting shares of a business operating outside of the investor's country of origin (World Bank, 1996). Consequently, increasing investment inflows is crucial for promoting economic growth (Ducet el., 2019, Nguyen et al., 2019 & Buckley et al., 2004). But Adeleke et al. (2014) argued that foreign investment relations in the pre-and post-independence eras were characterized by resource exploitation without commensurate growth, and this has impacted, among other things, several policies that would have attracted foreign investment into the oil industry (Okonkwo & Madueke, 2016). The potential of oil discovery, which is expected to play a significant role in the growth trajectories of many oil-dependent economies, is still being debated. Thus, the Nigerian oil industry was the main driver of growth before the oil prices collapsed. It produced 80% of revenue, over 60% of employment potential, and 56% of gross domestic product, accounting for roughly 95% of total foreign exchange earnings (Nweze & Edeme, 2016; Beghebo & Atima, 2013; World Bank, 2013).

The oil industry's contribution to economic growth has recently been minimal because of the decline in oil prices, albeit this varies over time. Although it is believed that a rise in oil revenue brings prosperity through improved production, the income from oil has not been able to address Nigeria's economic issues (Asagunla & Agbede, 2018; Bankole & Shuaibu, 2013; Ibeh, 2013; Mordi, 2006). The rising

poverty rate and poor infrastructure development have hampered the country's chances of growth, causing the populace to suffer as a result of the government's inability to reinvest proceeds from the oil sector in agriculture and manufacturing, which are capable of transiting the economy and improving people's welfare (Manasseh et al., 2019; Biodun, 2004). Thus, the proceeds from the oil boom are expected to reflect growth; however, evidence has shown that the revenue generated during this period did not affect growth, even in the presence of increasing investment inflows into the sector (Asagunla & Agbede, 2018). The Nigerian government's inability to diversify the economy by boosting the agricultural and manufacturing sectors has impacted the rate of growth and, as a result, has limited the inflow of foreign investment capable of stimulating the economy and promoting sustainable growth (Akinyemi et al., 2018; Uwubanmwen & Ogiemudia, 2016; Alabi, 2019; Akinyemi et al. 2018). According to Asiedu (2001), Clements et al., (2002), Demirsel et al., (2014), Dinh et al., (2019), and Adigwe et al., (2015), the development of the non-oil sector is a key determinant of investment inflow, whereas Olokoyo (2012), Ayashagba and Abachi (2002), Saibu and Keke (2014), Biodun (2004), Bouchoucha and Ali (2019) and Lumbila (2005) argued that FDI is critical for growth.

Against this backdrop, the current study seeks to investigate the extent to which foreign direct investment and oil revenue impact economic growth in Nigeria, as well as to account for the interactive effect of key macroeconomic environment indicators on FDI and oil revenue and their impact on economic growth. However, there are conflicting views on the relationship between FDI, oil revenue, and economic growth in Nigeria, and there is no proof of either these metrics or how they relate to that growth. Therefore, while some studies in Nigeria have suggested that foreign direct investment and oil revenue are directly related to economic growth (Aregbeyen & Kalowole,2015; Asogwa & Okpongette,2016; Ogunbiyi & Abina,2019; Manasseh et al.,2019; Nwoba & Abah,2017; Ogunbiyi & Abina,2019), others have suggested that these two factors are inversely related (Gravito et al., 2016, Elkomy et al., 2018, Uwubanmwen & Ogiemudia, 2016; Chunyang et al., 2020, Zhu, 2017; González, 2019; Adesola et al., 2014, Adelegan, 2000). Hence, previous studies produced mixed results and were unable to account for the interactive effect of FDI and oil revenue, volatile macroeconomic indicators, and the role of all international monetary transactions on economic growth in their models. this study added to the body of literature in four ways. It first considers how FDI and oil revenue interacts to affect economic growth. This is significant because oil is Nigeria's main source of wealth. Second, it takes into account the interaction between the exchange rate, interest rate, and inflation on foreign direct investment (FDI), oil revenue, and its influence on growth. This information is essential for showing Nigeria's macroeconomic environment and its capacity to foster an atmosphere that

could inspire trust in investors. Third, the impact of Nigeria's financial inflows and outflows on economic growth was estimated to account for the influence of all international monetary transactions between entities in Nigeria over a specific period. Fourth, the effect of FDI and oil revenue was calculated by classifying economic growth measures into three categories. While real GDP is the main proxy for growth, it was robustly checked with GDP per capita and GDP growth rate. This is to ensure that FDI and oil revenue are important drivers of Nigeria's economic growth and to avoid misguided policy recommendations.

The remainder of the study includes a review of the empirical literature discussed in section two, as well as the data and research methodology for the study discussed and presented in section three. Section four presents and discusses the findings. Section five summarizes the findings and makes policy recommendations based on them.

2. Empirical Literature Review

The belief that oil revenue and foreign direct investments are proven mechanisms for economic progress has raised concerns among researchers. Despite a significant increase in FDI revenue in the oil sector, research by Chunyang et al. (2020), Zhu (2017), and González (2019) demonstrated how FDI hampered growth. This is possibly due to emerging economies' poor fiscal policies and leakages, which have prevented FDI revenue from being used to strengthen those economies. In contrast, Manasseh et al. (2019) found that oil revenue is positively and significantly associated with growth. Furthermore, Nweze and Edeme (2016) and Akinlo (2012) discovered that changes in oil prices had a significant impact on per capita income and GDP. Subsequent study such as Gravito et al. (2016) discovered that 82% of its citizens live in poverty as a result of Nigeria's over-reliance on oil revenue. An overview of FDI in South Africa (SA) from 1980 to 2017 was examined by Musakwa and Odhiambo (2019). Analyzing the reforms, trends, and challenges that face FDI in the country, the study discovered a significant increase in FDI inflows in SA since 1990, which was cut short. As a result, the authors have proposed strategies for expanding bilateral trade agreements that can promote industrial growth, increase competition, and attract investment.

Studies such as Awolusi et al. (2017), Ushie et al. (2012), and Agrawal and Khan (2011) investigated the modalities and effects of FDI inflows on growth. They did note, however, that GDP, human capital, and international technology transfer have no significant influence on economic growth. Thus, in a similar study, Odularu (2008), Aregbeyen and Kalowole (2015), Asogwa and Okpongette (2016), Ogunbiyi and Abina (2019), Nwoba and Abah (2017), and Azubike and Onukwube (2016) all discovered a positive relationship between oil revenue and growth. To determine the markets' interdependence in ASEAN, Reboredo (2014) further investigates systemic

vulnerabilities and the link between the price of oil and renewable energy markets. Using the copula technique of analysis, the results show that the momentum of the oil price is responsible for approximately 30% of the rising risks faced by renewable energy enterprises. Reboredo (2017) demonstrated in a comprehensive analysis of the causal relationship between stock value collusion and renewable energy stocks that the short-term relationship between oil and returns from renewable energy is tenuous. The Granger causation between the energy market index and oil price is further supported by nonlinear data. Additionally, whilst Biodun (2004), Abayomi et al. (2015), Adedokun (2012), and Baghebo and Atima (2013) concentrated on the link between investment, oil revenue, and growth, Abogan et al. (2014), and Ude and Agodi (2014) concentrated on the connection between non-oil export and growth. These studies' findings were mixed, with slow growth in developing countries despite a fair share of FDI and massive oil revenue derived over time. Vrînceanu et al. (2020) investigated the relationship between oil price volatility and energy market returns. The analysis was carried out using daily data for the Brent Oil price and the World Energy Market Index from November 29th, 2010 to February 18th, 2020. According to the estimated results, renewable energy stocks have volatility clusters.

Furthermore, Uwubanmwen and Ogiemudia (2016) investigated the relationship between oil revenue and economic growth and discovered a negative correlation. Elkomy et al. (2018), Ogiogio (1995), and Adelegan (2000) all investigated the impact of foreign direct investment income on growth. The effective and efficient administration of oil revenues and macroeconomic indices is necessary for economic advancement, according to Adesola et al. (2014), Uzoigwe (2007), Azubike and Onukwube (2016), Olawunmi and Adedayo (2017), and Asume (2007). Similarly, Uwubanmwen and Ogiemudia (2016) contend that foreign direct investment has an impact on both short-term and long-term growth. They did, however, propose stable macroeconomic policies to attract FDI. Nweze and Edeme (2016) used the Johansen cointegration test and the Error Correction Mechanism (ECM) method to empirically investigate the impact of oil revenues and economic growth on investment in Nigeria. As a result, their findings point to a long-term negative relationship with growth. Similar to Idowu (2016), who used Granger causality and Johansen cointegration techniques to assess the effects of FDI on oil and non-oil revenue in Nigeria. The study discovered a co-integration between oil and non-oil revenue and GDP. He also stated that non-oil revenue has a positive relationship with growth, whereas foreign direct investment has the opposite relationship. The findings also revealed that the volatility of the oil price was a negligible predictor of the volatility of earnings. Adeleke et al. (2014) examined the impact of FDI on economic development using annual time series data from Nigeria. Conclusion: Foreign direct investment has a significant and positive impact on growth.

While enhanced FDI promotes increases in capital supply and a total output of the local forms, Nejati and Bahmani's (2020) study utilizing the CGE model to examine the economic consequences of FDI influx in the Iranian oil and gas industry found that it does not significantly foster productivity spillover. Further research reveals that the poor productivity spillover effect of FDI in the industry is caused by Dutch disease, which causes a decline in production and employment and hurts Iran's economy. Muramalla and Gawad's (2013) panel study on the relationship between FDI and oil and gas refineries (OGR) in seventeen selected countries discovered that FDI did not affect the increase in OGR production in the selected countries. Further research reveals that FDI is strongly linked to OGR export in the selected countries, with a particularly strong impact in China, Russia, and the United Arab Emirates. As a result, FDI inflows are found to be inversely related to OGR production and exports in the United Kingdom, France, Norway, Nigeria, and Angola. In addition, Chakarabarti (2001) claimed that natural resources and market factors are key drivers of FDI in thirty-one selected African countries in a study on the factors that drive FDI in the selected countries. However, the researcher was unable to identify the actual natural resources (e.g., oil, coal, natural gas, metals, etc.) or market factors (e.g., investor speculation, customer income, seasonal fluctuations, product supply and demand, and so on) that drive FDI in these countries. In a similar vein, data from Gui-Diby (2014) analysis of 50 African nations demonstrates that FDI is directly associated with economic growth between 1995 and 2009 but inversely related to growth between 1980 and 1994.

According to research by Adesola et al. (2014), there is an inverse relationship between economic growth and oil income in Nigeria and FDI. They therefore argued that an overreliance on oil revenues is impeding economic growth. The association between FDI and economic growth was studied by Siddique et al. 2017, and their research findings suggest that growth indicators and FDI have a positive link. As a result of the findings, they looked for legislation that would be successful and attract investment. Usman et al. (2015) and Asogwa and Okpongette (2016) investigated the impact of oil revenue on the Nigerian economy. According to their findings, oil revenues have no discernible impact on growth. Similar to this, Akinlo (2012) used multivariate VAR to examine the relationship between FDI and oil income. Oil revenues, according to the study, drive growth and expansion in non-oil sectors. However, the findings of Ibeh (2013) study contradict those of Akinlo (2012), implying that oil revenues have no significant impact on Nigerian growth. Okonkwo et al. (2016) discovered a similar result when studying the impact of foreign investment and oil revenues on economic development.

After investigating how changes in FDI might affect economic growth in five African countries, including South Africa, Nigeria, Egypt, Kenya, and the Central African Republic, Awolusi et al. (2017) discovered that FDI had an impact on growth

in Africa. Additional analysis revealed that South Africa's economic growth is more closely linked to an increase in FDI influx than the other countries. Using the dynamic ARDL, Ijirshar et al. (2019) examine the growth-differential effect of FDI and domestic investment (DI) in 41 African countries from 1970 to 2017. According to the study's findings, FDI and DI are significant long-term drivers of growth in Africa. Further investigation reveals that FDI inflows incentivize DI in Africa. In spite of the fact that both growth-led FDI and DI have a strong relationship with economic growth, the authors came to the conclusion that there is a significant difference between them. In the short run, the authors discovered a negative relationship between FDI and economic growth.

3. Data and Research Methodology

This section discussed and presented the source, nature, and type of data used for the analysis, as well as the research methodology used for estimation. In addition, because annual time series data are high-frequency data, various tests were performed. Unit root tests, normality tests, serial correlation tests, Ramsey reset tests, heteroscedasticity and cointegration tests are among the pre- and post-estimation tests performed. As a result, the variables were described before these tests, and the correlation analysis, which measures the strength of the association between two variables, was performed.

3.1 Data

As can be seen in Table 1 below, the study used an annual time series data sample that was taken from the National Bureau of Statistics (NBS) and the World Development Indicator (WDI).

Table 1 Variable Definition and Source

Variable	Acronyms	Definition	Source	Apriori
Economic Growth	Egrowth	Growth is the dependent variable here. It displays the evolution of a nation's wealth over time. It is typically expressed in terms of GDP and can be calculated using real GDP, GDP per capita, and GDP growth rate.	WDI (2020)	
Foreign Direct Investment Inflow	FDI	FDI inflows are the amount of foreign direct investment made in the economy by speculative investors.	WDI (2020)	+

Oil Revenue	OLR	OLR accounts for payments or duties owed to Nigeria, either directly or indirectly, in connection with oil resources.	NBS (2020)	+
Current Account Balance	CAB	The CAB tracks the inflow and outflow of money from Nigeria. It encapsulates the impact of every international financial transaction between nations.	WDI (2020)	+
Inflation	INF	INF calculates the percentage change in the price index over a given period. It is typically computed on a year-to-year or annual basis.	WDI (2020)	-
Interest Rate	INTR	The amount a commercial bank or lender charges a borrower is recorded by INTR. It represents a portion of the lent principal.	WDI (2020)	-
Real Exchange Rates	REXR	REXR measures the true purchasing power of Nigerian currency (Naira). It is the rate at which the Nigerian naira is exchanged for foreign currency.	WDI (2020)	-

Source: Authors' Conception.

The fundamental properties of the data are listed in table 2 below, along with the correlation matrix. The supporting evidence in the table below provides a quantitative justification for the variables used in the study as well as an illustrated summary of the sample.

Table 2 Descriptive statistics and Correlation Matrix

	RGDP	FDI	OLR	CAB	INF	INTR	REXR
Mean	0.793826	0.108195	1.843807	0.028129	0.330227	0.081654	4.176415
Median	0.669723	0.069743	0.956684	-0.114344	0.321192	0.033789	2.745443
Maximum	1.984238	0.766835	8.801416	0.862501	0.887076	0.760105	1.769903
Minimum	0.121666	-0.053734	-0.132973	-0.446520	0.020350	0.001587	1.328090
Std. Dev.	0.434312	0.169589	2.586692	0.432054	0.283078	0.165579	3.509514
Skewness	0.774165	2.617512	1.820445	0.777389	0.538907	3.203826	2.162866

Kurtosis	3.310447	10.05559	4.872506	2.045183	2.028353	12.33645	8.559911
Jarque-Bera	3.013226	93.26741	20.25452	4.022556	2.544483	154.9412	59.96303
Probability	0.221659	0.000000	0.000040	0.133818	0.280203	0.000000	0.000000
Sum	23.02095	3.137643	53.47040	0.815745	9.576586	2.367961	1211.160
RGDP	1						
FDI	-0.217537	1					
OLR	0.138538	-0.042328	1				
CAB	-0.162693	-0.393531	-0.307715	1			
INF	-0.521407	0.132114	0.893809	-0.615730	1		
INTR	-0.649427	-0.290414	-0.171523	0.450744	-0.348174	1	
REXR	0.750777	0.615761	0.407394	-0.293919	0.471423	-0.244639	**1**

Source: Author's Conception based on World Bank Data.

Table 2 shows that the minimum and maximum coefficient values are 2.901768 and 12.45747, respectively. According to the significant Jarque-Bera test probability values, there is no evidence of serial correlation in the model for any of the variables. The degree of association between variables was also assessed using the correlation matrix shown in Table 2 above. The coefficients of FDI, CAB, INF, and INTR had a weak and negative correlation with RGDP, while OLR had a positive but weak correlation with RGDP. REXR is also strongly linked to RGDP. The outcome confirms the suspicion that the variables will converge over time. To that end, a cointegration test was performed by performing unit root tests on the model's residual to confirm whether the variables are indeed cointegrated, as shown in Table 3 below.

3.2. Research Methodology

The estimating method employed in this investigation was the ordinary least squares (OLS) approach. The residuals of this model are likewise decent, and it yields results that are acceptable. This model yields acceptable results and residuals with zero mean constant variance that are uncorrelated with one another. It also produces the best linearly unbiased estimate (BLUE) when compared to other estimation methods, and the coefficient estimates converge to the true population parameters. The following conditions must be met for the OLS technique to work correctly: (a) that the parameters are linear; (b) that X is considered to be non-probabilistic; (c) that the

conditional mean I equals zero; and (d) that the parameter I is homoscedastic or homovariant. In addition, with the above conditions, the model for the study is mathematically specified as shown in eqn.1 below based on the assumptions that (e) there is no autocorrelation between perturbations, (f) there is zero covariance between I and X1, (g) the number of observations (n) must be greater than the explanatory variables, and (h) X is a finite positive.

$$\hat{y} = mX + b \tag{1}$$

In this equation, $\hat{y}$ represents the projected value, b; is the line's intercept, and m; is its slope. The coefficients m and b can be termed the coefficients of determination. The m and b can be approximated using the OLS method by minimizing the residuals. Minimizing the sum of squared errors between the actual and expected values also aids in the search for the best-fit line for the data. As a result, eqn.1 can be converted into eqn.2, an econometric model.

$$Egrowth_t = \lambda_0 + \mathbb{Z}_t W_t + \beta_t C_t + \Sigma_t \tag{2}$$

where the intercept parameter, which characterizes the state of the unobserved random variable in the absence of the explanatory variable, is denoted by (λ) and the dependent variable is denoted by $Egrowth_t$. Similarly, $\mathbb{Z}_t$ and β_t represent the coefficient parameters of the main description (W_t) and control (C_t) variables, which describe the magnitude of the linear relationship. An unobserved disturbance term is represented by Σ_t. Thus, eqn.2 is expanded into the base model represented by eqn.3.

$$RGDP_t = \lambda_0 + \mathbb{Z}_1 FDI_t + \mathbb{Z}_2 OLR_t + \beta_1 CAB_t + \beta_2 INF_t + \beta_3 INTR_t + \beta_4 REXR_t + \Sigma_t \tag{3}$$

While real gross domestic product (RGDP t) is the dependent variable and ζ and λ remain as previously defined. $\mathbb{Z}_1$ and $\mathbb{Z}_2$is the coefficients of the foreign direct investment (FDI_t) and oil revenue (OLR_t), while $\beta_1, \beta_2, \beta_3 and\, \beta_4$ are the coefficients current account balance (CAB_t), inflation (INF_t), interest rate ($INTR_t$) and real exchange rates ($REXR_t$) which serves as control variables. Hence, in the base model (eqn.3), real gross domestic product (RGDP) serves as proxy for economic growth ($Egrowth_t$). To further ascertain if truly foreign direct investment (FDI_t) and oil revenue (OLR_t) are efficient and effective predictors of $Egrowth_t$, other measures of economic growth such as GDP per capita and GDP growth rates are factored into eqn.3 which is replicated in the equations below. These models as indicated in eqn.4 and eqn.5 serves as robustness check models.

$$GDPpc_t = \phi_0 + \Psi_1 FDI_t + \Psi_2 OLR_t + \Pi_1 CAB_t + \Pi_2 INF_t + \Pi_3 INTR_t + \Pi_4 REXR_t + \mu_t \quad (4)$$

$$GDPgrt_t = \theta_0 + \pi_1 FDI_t + \pi_2 OLR_t + \omega_1 CAB_t + \omega_2 INF_t + \omega_3 INTR_t + \omega_4 REXR_t + \lambda_t \quad (5)$$

In eqns.4 and 5 above, $GDPpc_t$ and $GDPgrt_t$ represent GDP per capita and GDP growth rates while other explanatory variables remain as defined. Ψ_1, Ψ_2 *and* π_1, π_2 are the coefficients of the explanatory variables while Π_1, Π_2 *and* ω_1, ω_2 are the coefficients of control variables. Also, ϕ_0, θ_0 *and* μ_t, λ_t are the constant and error terms respectively. To test for the null hypothesis which state that FDI_t and OLR_t do not impact significantly on $Egrowth_t$ stated below, eqn.3, 4 and 5 are deployed.

Null Hypothesis (H_0)		**Alternative Hypothesis (H_1)**	
$\mathrm{Z}_1 = \mathrm{Z}_2 = \beta_1 = \beta_2 = \beta_3 = \beta_4$	eqn.1	$\mathrm{Z}_1 \neq \mathrm{Z}_2 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4$	eqn.1
$\Psi_1 = \Psi_2 = \Pi_1 = \Pi_2 = \Pi_3 = \Pi_4$	eqn.2	$\Psi_1 \neq \Psi_2 \neq \Pi_1 \neq \Pi_2 \neq \Pi_3 \neq \Pi_4$	eqn.2
$\pi_1 = \Psi\pi_{1_2} = \omega_1 = \omega_2 = \omega_3 = \omega_4$	eqn.3	$\pi_1 \neq \Psi\pi_{1_2} \neq \omega_1 \neq \omega_2 \neq \omega_3 \neq \omega_4$	eqn.3

4. Results Presentation and Discussion

This section presents and discusses the estimated results. Following the OLS assumptions and the nature of high frequency data used for the study, the variables were consciously screened by subjecting them to various pre and post estimation tests as earlier stated. We also ascertain whether the variables for the study are non-stationary or rather possesses a unit root by subjecting all the variables to Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test as reported (see table 3). Furthermore, we checked for the possibility of the variables and their lags correlating with one another by performing Breusch-Godfrey serial correlation LM test. This test helps to ensure that these variables and their respective lags are not correlated. In like manner, we also verify if the data set is normally distributed or not by subjecting the model to normality test. Finally, we performed heteroskedasticity test and Ramsey RESET test respectively to check if variance of the error from the model relies on value of the explanatory variables, and to determine if the models are suffering from omitted variables problem to avert the problem of model specification error. The outcome of all pre and post estimation tests are reported in tables 5 and 6.

4.1. Unit Root Tests

The level of stationarity of the series' variables was determined using the Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) unit root tests, as previously

mentioned. This test enables us to eliminate incorrect or biased results (see table 3). The Philps-Perron test, as opposed to the Kwiatkowski-Phillips-Schmidt-Shin test, uses a nonparametric correction to the statistics while assuming heteroscedastic white noise (KPSS). This test was created with the assumption that variables are either stationary at the level or stationary at the first difference. The decision criteria are that if the ADF and PP statistic is higher than the critical value or the p-value>0.05 significance level, we reject the null hypothesis, which stated that the variables have unit roots. The null hypothesis is rejected based on the results in Table 3. This means that the variables are stationary and have no unit root. Except RGDP and CAB, which are integrated at levels (I ∼(0)), the results show that almost all of the variables are integrated of (I ∼(1)). After confirming the stationary nature of the variable in the model, we move on to look into whether there is cointegration between the variables.

Table 3 Unit Root Test Results

Variables	ADF	Order of Integration		PP	Order of Integration	
		Level	First Difference		Level	First Difference
RGDP	-3.122249**	I~(0)	-	-6.796544***	-	I~(1)
GDPpc	-3.574817***	-	I~(1)	-2.855110**	-	I~(1)
GDPgrt	-7.273213***	-	I~(1)	-7.124805***	-	I~(1)
FDI	-5.649320***	-	I~(1)	-5.867236***	-	I~(1)
OLR	-4.033180***	-	I~(1)	-3.997182**	-	I~(1)
CAB	-4.489252***	I~(0)	-	-4.500296***	I~(0)	-
INF	-5.233694***	-	I~(1)	-5.735079***	-	I~(1)
INTR	-5.704383***	-	I~(1)	-2.408365**	I~(0)	-
REXR	-6.881757***	-	I~(1)	-6.782202***	-	I~(1)

Source: Author's computation. ***, ** and *: represents 1%, 5% and 10% levels of significance.

4.2. Residual Cointegration Test

Because all variables are integrated in the same order and the correlation matrix test in table 2 above indicated some degree of relationship, it is critical to investigate for cointegration by subjecting the residual obtained from the series to the Augmented Dickey-Fuller (ADF) test at levels. If the critical value at 5% is greater than the ADF test statistics in accordance with the decision rule, we reject the null hypothesis that there is no cointegration between the variables. It was clear from a detailed examination of the results in Table 4 that the ADF statistic (-3.460333) is higher in absolute terms than the 5% critical value (-2.976263). The acquired results in model (1) are obviously similar to those in models (2) and (3). Thus, evidence from residual cointegration tests indicates that the variables are cointegrated. As a result, the null hypothesis of no cointegration is rejected, and we conclude that the variables are cointegrated and move together in the long run.

Table 4. Residual Cointegration Result

Model	ADF-test Statistic	1%	5%	10%	Prob.
1	-3.460333	-3.699871	-2.976263	-2.627420	0.0174
2	-3.332266	-4.356068	-3.595026	-3.233456	0.0034
3	-7.352888	-3.711457	-2.981038	-2.629906	0.0000

Source: Author's computation. ***, ** and * represents 1%, 5% and 10% levels of significance.

4.3. OLS Estimated Results

Table 5 displays the results of the baseline model as well as the pre and post estimation tests. However, we addressed the cointegration problem implied by the results in table 4 by fitting the error correction term (ECM (-1)) in the baseline model in eqn.3 for final estimation, which was also extended to eqns.4 and 5 in table 6. Therefore, together with the pre and post estimation tests previously mentioned, the ECM result is displayed in table 5. The post estimation result demonstrates that the series has no autocorrelation because the DW statistic value is 2.091, which is in accordance with the general rule. The Breusch-Godfrey serial correlation LM test findings indicate a statistically significant level of p-value (0.1109) >0.05. The heteroscedasticity test also showed that the p-value (0.7766) was statistically significant at the level of 0.05. These findings demonstrate that, in contrast to the null hypothesis of homoskedasticity, the null hypothesis of no serial correlation should be accepted. As a result, there is no issue with heteroscedasticity in the series and the residuals were not autocorrelated.

Table 5 Summary of Estimated Results from Baseline Model

Variable	Coefficient	Std. Error	t-Statistic
CAB	0.292434**	0.062164	4.704234
D(FDI)	0.518523**	0.112986	4.589268
D(OLR)	0.141948***	0.018872	7.521619
D(INF)	-0.310980	0.435910	-0.713404
D(INTR)	1.475635**	0.651195	2.266042
D(REXR)	0.134706**	0.022585	5.964401
D(FDI*OLR)	-0.485702***	0.054166	8.966917
ECM (-1)	-0.637552***		
Constant	-0.253800		
R-Squared	0.628347		
Adj R-Square	0.469756		
DW Stat	2.090780		
Normality Test	81.2795 (0.0000)		
Serial Cor Test	5.65094 (0.1109)		
Ramsey Reset Test	-3.03605 (0.0000)		
Het Test	0.53389 (0.7766)		

Source: Author's Computation. RGDP is used as the dependent variable. ***, ** and *: represents 1%, 5% and 10% levels of significance. (.) is the p-value. DW; Durbin-Watson.

The results from the estimated baseline model shows that oil revenue and FDI have a significant impact on economic growth. Given the existing positive link between FDI and RGDP, it is clear that FDI is a reliable predictor of economic growth in Nigeria, with an increase in FDI causing a 51.8% increase in economic growth. This study also backs up the findings of Awolusi et al. (2017), Ushie et al. (2012), and Agrawal and Khan (2011) that foreign direct investment (FDI) has a positive impact on economic growth and that policies to encourage FDI inflows should be implemented. In a similar vein, we observed OLR act with the same manner in regards to FDI. OLR hence has a positive and significant relationship with RGDP. Thus, a percentage rise in OLR causes an increase in economic growth of 14.2%. This is consistent with the findings of Aregbeyen and Kalowole (2015), Asogwa and Okpongette (2016), Nwoba and Abah (2017), Asogwa and Manasseh (2014), and Azubike and Onukwube (2014). (2016). According to these studies, an increase in oil revenue leads to an increase in economic growth. Although oil revenue may have had a significant impact on economic growth, the magnitude of the effect is small.

This result supports the claim that Nigeria's oil sector contributes less to economic growth than expected.

Additionally, we evaluate the impact of the current account balance (CAB) to account for the financial inflow and outflow into and out of Nigeria, as well as to comprehend the rate at which all of the international monetary transactions between businesses could support economic growth in Nigeria. According to the findings, CAB has a sizable and immediate impact on RGDP. This implies that a rise in money input and outflow as well as economic activity/transactions promotes economic growth. Therefore, a unit increase in CAB results in an increase of 0.292434 in RGDP. Therefore, it is necessary to start policies that could encourage financial inflow and investment inflow in Nigeria. Inflation (INF), interest rates (INTR) and exchange rates (REXR) significantly affect economic growth (RGDP) after adjusting for the impact of other macroeconomic indicators. The outcome of the current link between INTR, REXR, and RGDP did, however, deviate from the a priori prediction. This result could be explained by the fact that the demand for loanable funds in Nigeria exceeds the supply of funds. As a result, people with the financial capacity to service the higher interest rate associated with the loan tend to borrow more when the lending rate is high due to an increase in demand for loans without a corresponding increase in supply - this is practiced by the majority of commercial banks in some developing countries in Africa. The implication is that this practice restricts many young entrepreneurs' ability to grow their small and medium-sized businesses. As a result, the relationship between REXR and RGDP could be the result of Nigeria's inward-looking policies. Because of the underlying variables' long-run stochastic tendency, an error correction model (ECM) approach was estimated to account for both the short- and long-term effects of one time series on another.

In addition, we also consider the interactive impact of FDI and OLR on economic growth in order to gain a better understanding of the model's FDI and OLR linkages. According to the findings, the interactive term has a negative and significant impact on Nigeria's economic growth. This outcome could be related to a decline in foreign direct investment (FDI) inflows into Nigeria, which has been associated with a weak business climate and poor enforcement of property rights as pointed in research by Manasseh et al., (2017), Ogbonna et al., (2022), and Manasseh et al., (2017, 2022). Consequently, the ECM (-1) value (-0.637552) calculates the rate at which a dependent variable returns to equilibrium after an alteration in another variable. The short run comprises 63% of the long run in the midst of this. The evidence from the study's results is also in line with the studies by Ayanwale (2007), Awolusi et al. (2017), Menh and Terukazu (2005), Duc et al. (2019), Nguyen et al. (2019), Buckley (2004), Adeleke, et al. (2014), Ikeotunye et al. (2016), Nweze and Edeme (2016), Asagunla and Agbede (2018), and Manasseh et al. (2019).

4.4. Robustness Check

A robustness check was conducted, and the findings are shown in Table 6 below, in order to confirm the results shown in Table 5 above and to determine whether FDI and OLP really had an impact on economic growth. Therefore, economic growth originally represented by RGDP is now assessed using per capita GDP (GDPpc) and GDP growth rate (GDPgrt), with other explanatory variables remaining as previously established.

Table 6 Estimated Robustness Results

Variables	(1)	(2)	(3)	(4)
CAB	0.014*** (0.003)	0.0404** (0.012)	0.512*** (0.11)	0.443** (0.101)
D(FDI)	0.034*** (0.064)	2.157* (1.017)	0.717*** (0.211)	0.268** (0.105)
D(OLR)	0.308** (0.076)	0.637*** (0.117)	0.401***(0.0402)	0.510** (0.121)
D(INF)	-0.124*** (0.017)	-0.627** (0.129)		
D(INTR)	-0.049*** (0.006)	-2.917** (0.826)		
D(REXR)	-0.0001 (0.0007)	-0.006 (0.016)		
D(FDI*OLR)	-0.281** (0.004)	0.317*** (0.011)	-0.471*** (0.037)	0179*** (0.118)
D(FDI*REXR)	-0.645*** (0.071)			
D(OLR*REXR)		-0.312** (0.100)		
D(FDI*INTR)			-0.732*** (0.112)	
D(OLR*INTR)				-1.600** (0.429)
D(FDI*INF)			-3.112** (1.011)	
D(OLP*INF)				-0.078** (0.025)
ECM (-1)	-0.42218**	-0.452654***	-0.3421327**	-0.411163***
Constant	0.027320	-0.038023	0.037110	-0.041702
R-Squared:	0.197178	0.75467	0.291150	0.215770
Adjusted R- Squared:	0.127367	0.546595	0.186737	0.206115
Durbin-Watson:	1.864038	2.624173	1.711031	2.001131
Serial Correlation Test:	2.165721	0.622054	1.851	0.411

	(0.1408)	(0.5469)	(0.1317)	(0.45671)
Heteroscedasticity Test:	0.38620	0.184522	0.477	0.163
	(0.8791)	(0.9779)	(0.9682)	(0.66111)

Source: Author's Computation. (.); standard deviation. ***, ** and *: represents 1%, 5% and 10% levels of significance. In column 1 & 3, GDPpc is the dependent variable; GDPgrt served as the dependent variable in column 2 & 4.

The results of the robustness assessment confirmed the earlier findings that FDI and OLR significantly impacted economic growth. The findings in columns (1) and (2) show that an increase in FDI and OLR induces an increase in economic growth of 1.4% and 4%, respectively. Similar findings were obtained from columns (2) and (3). This implies that foreign investment is critical for Nigeria's economic growth. As a result, in order to encourage FDI inflows into Nigeria, the Nigerian government should implement policies that improve security and maintain a less volatile macroeconomic climate. Furthermore, we discovered that the current account balance (CAB), which supports our previous findings, is positively related to economic growth.

Our research into the interaction between the macroeconomic environment and economic growth led us to the conclusion that the exchange rate environment has a significant impact on the growth-related effects of FDI and OLR. As shown in columns (1) and (2) above, the interacting effects of D(FDI)*D(REXR) and D(OLR)*D(REXR) have significant and detrimental effects on economic growth, respectively. This demonstrates that Nigeria's oil revenue and foreign direct investment (FDI) inflows are both negatively impacted by the high exchange rate. These conclusions may be correct, given that analysts have questioned why there hasn't been a reasonable FDI influx since the current government took office and that the exchange rate has been very high. The amount of oil revenue generated has also been a major source of concern. The drop in oil revenue, on the other hand, could be attributed to the global oil price collapse. It is critical to consider the effect of currency depreciation on a country's oil earnings. Furthermore, the interaction between the variables D(FDI)*D(INTR) and D(OLR)*D(INTR) in columns (3) and (4), as well as D(FDI)*D(INF) and D(OLP)*D(INF), was significant and had a negative impact on economic growth. Thus, it is important to emphasize the role that the macroeconomic environment plays in economic planning. Therefore, fostering FDI inflow, revenue, and overall economic growth is greatly encouraged by strengthening the macroeconomic environment. Likewise, we confirmed that we understand how FDI and OLR interact to affect economic growth (FDI*OLR). Our preliminary findings were found to be supported by the evidence in columns 1 and 3, which was in contrast to the evidence in columns 2 and 4.

The White heteroscedasticity test, cointegration, and the Breusch Godfrey serial correlation LM test are a few examples of OLS assumptions that must be considered to ensure that the variables behaved correctly. The results in Table 6 show that the models are well specified and that the serial correlation and autocorrelation are both zero. Despite the cointegration of the variables, ECM was used to correct movement over time. As a result, the ECM (-1) value (-0.637552) expresses the rate at which a dependent variable achieved equilibrium as a result of a change in explanatory variables. The short run accounts for 63% of the long run during this time period, and the coefficient of the error correction model (ECMs) across the columns indicates how quickly the long-run equilibrium returns to equilibrium.

4.5. Granger Causality

In order to further explore the patterns of association between FDI, oil revenue (OLR), and several metrics of economic growth in this study, we looked at the direction of a causal relationship between them, as shown in table 7 below. The Granger causality test also serves as a robustness check to identify and validate the type of link between FDI, OLR, and GDP. The results revealed a bidirectional causal relationship between oil revenue and economic growth (RGDP). To our great dismay, FDI and RGDP have no effect on one another. However, we also investigate the relationship between FDI, OLR, and other growth indicators such as GDPpc and GDPgrt. The robustness check results revealed a bidirectional causality link between FDI and GDPgrt, as well as OLR and GDPgrt, which supported previous findings. Furthermore, we discovered evidence of a one-way causal link between FDI and GDPpc and OLR and GDPpc, respectively. The principal source of income for the Nigerian economy is crude oil, and good management of the oil business may promote foreign investment in the nation, which explains the causal link between oil revenue and economic growth in both directions. As a result, effective use of oil wealth may increase the likelihood of Nigeria's economy becoming more diverse. Real policies that encourage investment inflows into the non-oil sector and the oil industry are required to support Nigeria's economic growth and sustainability.

Table 7 Granger Causality Results

Variable	Symbol	F-statistic	Proby.	Status
LnFDI – LnRGDP	≠	0.28318	0.5993	
LnRGDP - LnFDI	≠	1.19166	0.2854	None
LnOLR – LnRGDP	⟷	7.98294	0.0070	
LnRGDP - LnOLR	⟷	5.85337	0.0032	Bidirectional
LnOLR – LnFDI	⟷	8.24393	0.0007	
LnFDI - LnOLR	⟷	6.16662	0.0016	Bidirectional

LnGDPpc – LnFDI	≠	0.92488	0.1708	
LnFDI - LnGDPpc	→	6.00252	0.0035	Unidirectional
LnGDPpc – LnOLR	≠	0.99322	0.3871	
LnOLR - LnGDPpc	→	8.21562	0.0001	Unidirectional
LnGDPgrt – LnFDI	↔	9.42244	0.0000	Bidirectional
LnFDI - LnGDPgrt		5.01070	0.0094	
LnGDPgrt – LnOLR	↔	3.17231	0.0229	
LnOLR - LnGDPgrt		3.92402	0.0101	Bidirectional

Source: Author's computation. The decision was made based on a 5% per cent level of significance.

5. Conclusions and Recommendations

Using OLS estimation methods, we discovered that oil revenue and foreign direct investment had a significant impact on Nigerian economic growth. A robustness test using GDPpc and GDPgrt as alternative measures of economic growth while maintaining the original explanatory variables supported the evidence even more. The robustness assessment confirms that FDI and OLR significantly affect economic growth, which is in line with the preliminary findings. Furthermore, the impacts of CAB, REXR, and INTR on economic growth were also consistently supported by our research. CAB, REXR, and INTR are important factors in Nigeria's economic growth, according to the findings. The thorough examination also supported the argument that FDI and OLR are important contributors to economic growth. The findings held true even when regressions were run with other economic growth indicators. The findings presented above contradicted those of Chunyang et al., (2020) in Belt and Road countries and González et al., (2019) in Argentina. Chunyang et al., (2020) investigated the role of the Belt and Road Initiative in promoting FDI through its impact on institutional quality, whereas González et al., (2019) investigated FDI and its conflicting consequences. These studies concluded that foreign investment revenue contributed nothing to the growth of Belt and Road countries, which are primarily developing economies, due to weak institutions, and that insignificant FDI inflows and their negative impact on Argentina's economic growth are due to a deteriorating institutional framework. Our findings also contradict evidence from Gui-Diby (2014) on the inverse relationship between FDI and growth in fifty African countries. Despite this, FDI inflows and oil revenue have been shown to be important factors in determining economic growth, particularly when the business environment is secure and stable (Nejati and Bahmani, 2020; Manasseh et al., 2019; Ogbonna et al., 2022; Aregbeyen & Kalowole, 2015; Asogwa & Okpongette, 2016; Ogunbiyi & Abina, 2019; Nwoba and Abah, 2017; Azubike & Onukwube, 2016). Further examination of the interaction of macroeconomic

environment measures reveals that the effects of D(FDI*REXR), D(OLR*REXR), D(FDI*INTR), D(OLR*INTR), D(FDI*INF), D(FDI*INF), D(FDI*INF), and D(OLP*INF) on economic growth were all significantly negative. This demonstrates that a high inflation, interest rate, and exchange rate environment discourages FDI inflows and oil revenue growth. As a result, a stable macroeconomic environment is critical for promoting economic growth in Nigeria.

Given these findings, we recommend that the Nigerian government support FDI incentives such as tax holidays, tax reductions, property rights protection, and the creation of a favorable macroeconomic environment. It is critical to broaden the macroeconomic environment to include financial incentives such as grants and loans, as well as improved market conditions and infrastructure. Additionally, as oil revenue is crucial to Nigeria's economic development, we advise the inclusion of oil and gas revenues in the rural development plan. This development could lead to the creation of numerous jobs and an increase in the nation's overall output. Furthermore, given that the oil industry is the sole sector responsible for sustaining the Nigerian economy, we recommend allocating a significant portion of oil revenue to infrastructure development in order to encourage private sector growth. Furthermore, we advocate for governments and businesses in oil-exporting countries to support revenue transparency and appropriate revenue distribution strategies.

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Author Contributions

Manasseh, C.O and Nwakoby, I.C conceived the study and were responsible for the design and development of the data analysis. Manasseh, C.O and Ifediora, C.U was responsible for data collection and analysis and also for data interpretation. Nwonye, N.G and Okanya, O was responsible for the literature review section.

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