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Impact of Foreign Direct Investment on Nigerian Economic Growth

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Abstract: This study empirically examines the impact of Foreign Direct Investment (FDI) on Nigerian economic growth for the period 1981–2018. The objectives were to examine the joint impact of FDI, exports (EXP), and the official exchange rate (EXR) on real Gross Domestic Product (RGDP). A cross-sectional time-series design was adopted, utilizing secondary data sourced from the Central Bank of Nigeria Statistical Bulletin, the International Monetary Fund, and the World Bank Database. The Ordinary Least Squares (OLS) multiple regression technique was employed alongside Augmented Dickey–Fuller (ADF) unit root tests, Augmented Engle–Granger (AEG) co-integration analysis, and an Error Correction Model (ECM) to capture both short-run dynamics and long-run equilibrium relationships. Results confirmed that all variables are integrated of order one, I(1), and are co-integrated, establishing a long-run equilibrium relationship among RGDP, FDI, EXP, and EXR. The regression R^2 of 0.61 indicates that the explanatory variables account for 61% of variation in RGDP. All three regressors — exchange rate, exports, and FDI — exerted positive and statistically significant effects on RGDP. The ECM coefficient of −0.786 confirms rapid adjustment to long-run equilibrium, with 79% of disequilibrium corrected within one period. The results validate the Endogenous Growth Hypothesis and support the Export-Led Growth thesis for Nigeria. Policy recommendations focus on exchange-rate stability, economic diversification, infrastructure investment, anti-corruption measures, and targeted investment-promotion strategies to attract high-quality, long-term FDI inflows.

Keywords: Foreign Direct Investment; Economic Growth; Nigeria; Exchange Rate; Exports; Ordinary Least Squares; Error Correction Model; Co-integration; Endogenous Growth

1. INTRODUCTION

Foreign Direct Investment (FDI) can be defined as investment made by a firm or individual in one country into business interests situated in another country, either by purchasing a company in that country or by extending operations of an existing business activity in that country [1]. It is a direct investment into a business in a nation by an individual or organization of another nation.

Policymakers have widely opined that FDI produces positive outcomes on host economies. A portion of these advantages takes the form of externalities and the adoption of foreign technology. FDI is perceived to have a positive impact on economic growth of a host nation through various direct and indirect channels. It enlarges domestic investment, which is vital to the attainment of sustained growth and development [2].

FDI is expected to reduce the differences between gross domestic investment and domestic savings [3]. Various economists have posited that the integration of developing nations with the global economy increased during the 1990s with changes in their economic policies and lowered barriers to trade and investment [4, 5].

The Nigerian economy has a great demand for goods and services. The amount of foreign investment into Nigeria amounted to USD 2.23 billion in 2003 and rose to USD 5.31 billion in 2004, representing an increase of 38%. The figure rose to USD 9.92 billion in 2011 and USD 12.23 billion in 2013. However, FDI forms a small percentage of the nation's GDP, making up 5.79% in 1994, 1.73% in 2003, 1.91% in 2004, 2.93% in 2009, 2.15% in 2011, 2.08% in 2013, and 1.93% in 2017 [6]. This raises the empirical question of whether FDI meaningfully drives aggregate output in Nigeria.

Prior to the late 1970s and early 1990s, FDI played a major role in the Nigerian economy. During this period, much of the non-agricultural sector was controlled by large foreign-owned trading companies that had a monopoly on the distribution of imported goods, with an average of 65% of total capital in foreign hands. Successive governments viewed FDI as a vehicle for political and economic domination, and the Nigerian Enterprise Promotion Decree (NEPD) sought to regularize rather than promote FDI [7]. Between 1982 and 2000, official policy towards FDI was restrictive, with the regulatory environment discouraging foreign participation and resulting in an average FDI flow of only 1% of GDP from 1983 to 2000 [5].

Exchange rate is the value of one nation's currency versus the currency of another [8]. A high exchange rate results in low FDI inflows; conversely, a competitive exchange rate that signals economic stability may attract FDI, which in turn contributes to improved GDP performance [9].

Exports represent one of the most important sources of foreign exchange income, easing pressure on the balance of payments and creating employment opportunities while increasing productivity and living standards [10]. Export expansion can also accelerate the growth process

by providing foreign exchange required to procure capital goods and intermediate inputs for industry [11]. Therefore, export expansion can be argued to be a stimulus of economic growth [12].

It is pertinent to ascertain whether FDI, exchange rate, and exports together promote economic growth because Nigeria faces challenges including inadequate resources for long-term development, low-capacity utilization, high poverty, unemployment, and high insecurity [5]. Given Nigeria's position as a country with a high natural resource base—especially crude oil—and a large market size, it qualifies as a noteworthy recipient of FDI in Africa and has been one of the top three African nations consistently receiving FDI in recent decades.

This study differs from prior work in that it simultaneously examines the impact of FDI, exchange rate, and export earnings on Nigeria's economic growth within a unified econometric framework. The study uses annual data from 1981–2018, employing OLS, unit root, co-integration, and ECM analyses.

1.1 Research Questions

This research seeks to provide answers to the following questions:

1. Is there a significant impact of foreign direct investment on Nigeria's economic growth?
2. Is there a significant impact of exports on economic growth in Nigeria?
3. Is there a significant impact of exchange rate on economic growth in Nigeria?

1.2 Research Hypotheses

The following null hypotheses are tested:

H_{01}: There is no significant impact of foreign direct investment on Nigeria's economic growth.

H_{02}: There is no significant impact of exports on Nigeria's economic growth.

H_{03}: Exchange rate has no significant impact on Nigeria's economic growth.

1.3 Significance of the Study

The findings of this study provide the government, economic managers, and citizens with valuable insights into the impact of FDI on economic development in Nigeria. The findings serve as an eye-opener to relevant stakeholders involved in economic management regarding whether to encourage FDI. Additionally, the study adds statistical data to prior research and serves as a reference for further studies on related topics.

The study is based on a cross-sectional survey from 1981–2018 using secondary data sourced from the Central Bank of Nigeria's Annual Survey annual report. Constraints encountered included inadequacy of recent materials and limited time available for completion.

2. LITERATURE REVIEW

2.1 Economic Growth

Economic growth is a process whereby a nation's real national income as well as per capita income increases over a long period of time. It implies the effect of specific forces which work over a significant period of time and encompasses changes in asset supplies, the rate of capital formation, innovation, demographic composition, and institutional and organizational structures. It also implies changes in the structure of demand for products, the level and pattern of income distribution, the size and composition of the population, standards of living, and social relations [13].

Nigeria is a mixed economy and emerging market. Its manufacturing sector became the largest on the African continent in 2013, producing a large proportion of goods and services for the West African sub-continent [14]. Table 1 below illustrates the global ranking trend of Nigeria's economic growth.

Table 1. Global Ranking of Nigeria's Economic Growth (Real GDP Growth Rate)

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Growth Rate	3.44%	8.21%	6.83%	6.27%	6.93%	7.84%	4.89%	4.28%	5.39%	6.31%	2.65%	−1.62%	0.81%
Global Rank	52	47	38	37	34	31	31	30	23	20	21	22	23

Source: Nairametrics (2017)

2.2 Theoretical Framework

2.2.1 Solow–Swan Model and Economic Growth

The Solow–Swan model, also known as Exogenous Growth Theory, is an economic model of long-run growth set within neoclassical economics. The theory assumes that economic growth is generated through exogenous factors such as the stock of capital accumulation, labor or population growth, and increases in productivity commonly referred to as technological progress [15].

In the Solow-type growth model, developed independently by Robert Solow and Trevor Swan in 1956, FDI enables host nations to achieve investment that surpasses their own domestic savings and enhances capital formation. The potential beneficial impact of FDI on output growth is confined to the short run in this framework. Mankiw (2003) applied the Solow model to argue that private organizations invest in both conventional types of capital such as bulldozers and steel plants, as well as newer forms such as computers.

Solow (1957) argued that economic growth is an 'output' positively influenced by 'inputs' such as technology, capital, labor, and a vector of additional economic variables including imports, exports, and institutional dummies. This relationship is determined by:

$$Y = A \cdot \varphi(K, L, \Omega)$$

Where:

Y = total output or GDP (or growth rate)

K = capital investment

L = labor force

A = efficiency of production (constant of the model)

Ω = vector of additional variables

Findlay (1978) extended the Solow model by assuming that the growth rate of technological diffusion is an increasing function of FDI, classifying foreign capital as a distinct input — giving rise to what became known as Endogenous Growth Theory. Endogenous growth theory identifies economic growth as promoted in the long run by new technological production processes introduced via FDI, with FDI assumed to be more productive than domestic investment [16, 17]. FDI enhances economic growth through technological spillovers that offset diminishing capital return effects by boosting the existing stock of knowledge through labor mobility, training, skills, and organizational arrangements [18, 19].

Based on the Cobb–Douglas production function, the Solow model takes the form:

$$Y = A \cdot K^{\alpha} \cdot L^{\beta} \cdot \Omega^{\gamma}$$

By logarithmic transformation:

$$\ln Yt = \ln A + \alpha \ln Kt + \beta \ln Lt + \gamma \ln \Omega t + \varepsilon t$$

Where α, β, and γ represent the output elasticities with respect to capital (decomposed into FDI and domestic investment DI), labor (measured by average salary or number of employees), and auxiliary variables (qualitative indicator variables for technology, foreign trade, population, etc.) over time t, with εt as the error term.

2.2.2 Export and its Impact on Economic Growth

Developing economies have adopted various measures for accelerated development including promotion of export earnings. According to Azam (2009), the drift from trade-restricted to trade-liberalized economies is credited to the positive relationship between export performance and economic development.

The Export-Led Growth (ELG) hypothesis, which states that exports have a positive impact on economic growth, is well established in the international trade literature [12]. The simplest explanation is that as the contribution to growth from domestic consumption is limited to the size of regional or national markets, sales to foreign markets represent additional consumption demand that increases real output produced in the economy. Export expansion is also associated with static gains including access to larger markets and the exploitation of economies of scale, as well as dynamic gains through resource allocation efficiency and employment generation [11].

2.2.3 Impact of Exchange Rate on Economic Growth

Exchange rate is the required amount of one unit of domestic currency expressed in terms of its foreign counterpart — in Nigeria's case, the price in naira of one US dollar [9]. Several theories address the connection between exchange rates and economic growth. The earliest and leading theoretical foundation for exchange rate regime choice rests on the Optimal Currency Area (OCA) Theory developed by Mundell (1961) and McKinnon (1963). The theory is concerned with the stabilization of business cycles and trade, and argues that a fixed exchange rate regime can increase trade and output growth by reducing exchange rate uncertainty and the cost of hedging, and by encouraging investment through lower currency risk premiums on interest rates.

Aliyu et al. [20] examined exchange rate pass-through in Nigeria for the period 1986–2007 using a Vector Error Correction Model with an ARDL specification. The model expressed was:

$$EXC = f(GDP, INF, INT, M2)$$

They found that the exchange rate pass-through in Nigeria was low and declined along the price chain, partly overturning the conventional view that exchange rate pass-through is always considerably higher in developing countries. They suggested that in the long run, pass-through would likely increase, and that monetary policy should be designed to accommodate this effect.

Adedoyin et al. [21] also employed the ARDL model, using real GDP as the proxy for economic growth and inflation rate, exchange rate, interest rate, and money supply as macroeconomic proxies. Their results showed that exchange rate fluctuation had no effect on economic growth in the long run, though a short-run relationship existed between the two variables.

2.3 Foreign Direct Investment

The World Bank (1996) defined FDI as a venture made to gain lasting management interest in an enterprise operating in a country other than that of the investor. FDI is a concept that arises from globalization, which involves the integration of the domestic economic system with worldwide markets [22]. Technological advancement prompted the rise of improved transport and communication, leading to movement of investors beyond political boundaries, especially during the post-colonial period [23].

However, FDI does not come without negative aspects. There is a tendency for overuse of accessible natural resources as organizations endeavor to boost profitability. Other negative dimensions include importation of capital-intensive and obsolete technology, exploitation of local labor, contribution to monetary leakage, lack of linkages with local communities (the 'enclave' problem), adverse impacts on competition in national markets, corruption, environmental pollution especially in manufacturing, and political dependence on FDI source nations [24, 25].

Equity capital — the foreign direct investor's purchase of shares in an enterprise in another country — is computed at estimated current market value and includes common and preferred shares, reserves, capital contributions, and reinvestment of earnings. In Nigeria, the equity capital stake of 10% is normally considered the threshold for the control of assets [26].

2.3.1 Determinants of Foreign Direct Investment

According to Ajayi (2006), in making decisions to invest abroad, firms are influenced by a wide constellation of economic, political, socio-cultural, and geographic factors. Not all determinants are equally critical to every investor in every location at all times [27].

Market size and growth have been shown to be the most prominent determinants of FDI, particularly for market-seeking investment. In countries with large markets, FDI stock is expected to be high since market size is a measure of market demand. Availability of good infrastructure increases the productivity of investment and therefore stimulates FDI flows [28]. Country risk — encompassing economic and political uncertainty — is critical, with research consistently documenting a negative relationship between FDI and instability.

Openness of an economy is known to cultivate FDI inflows: the more open an economy, the more likely it is to attract foreign investment [29]. The institutional environment, including corruption levels and bureaucracy, directly influences business activity. The availability of natural resources is a basic attraction factor in Africa, where approximately 60% of FDI has historically been allocated to oil and natural resource sectors [30]. Return on capital — often measured inversely by real GDP per capita — is also an important driver, as investors channel capital to economies where returns are higher [28].

2.4 Foreign Direct Investment and Economic Growth

The principle underlying FDI advancement policies in many developing nations is the assumption that FDI inflows cultivate economic development. As FDI is a composite bundle of capital, know-how, and innovation, its effect on economic development is multi-dimensional [16]. Both immediate and indirect impacts are recognized.

In the Harrod (1939) and Domar (1947) growth models, savings are key drivers of capital accumulation and growth. Since raising savings may be difficult in the short term, particularly for developing countries, economists led by the IMF and World Bank have advised nations to borrow savings from abroad — via loans, portfolio investments, and FDI — to augment domestic savings and achieve targeted growth rates. However, foreign investment is not without risks such as profit extraction and the retooling of an economy for foreign purposes [31]. Herzer, Huhne, and Nunnenkamp (2014) found a significant increase in inequality in developing countries from FDI, with causality running from FDI to inequality.

When neoclassical growth theory (Solow 1956; Swan 1956) replaced the Harrod–Domar model, a new rationale for capital flows from rich to developing nations emerged: given diminishing returns to capital, returns should be higher in developing countries, enticing capital from rich to poor nations and helping the latter catch up. Yet empirical evidence has suggested otherwise: long-run growth is empirically due to technical progress, not capital or investment [15]. Moreover, capital was found to flow from poor to rich countries rather than the reverse [32]. Technology transfer via FDI therefore remained a key recommendation by international organizations.

When Endogenous Growth Theory (Barro, 1990) challenged the Solow–Swan framework by emphasizing the role of technology, FDI remained justified as a vehicle for technology transfer that ignites domestic productivity [33]. Yet evidence that technology is transferred to receiver countries has remained sparse [34]. China exemplifies recent FDI dynamics, with inflows reaching USD 19.1 billion in the first half of 2012, making China the largest recipient of FDI globally at that time, surpassing the United States [30].

2.5 Foreign Direct Investment in Africa

Following political independence in the 1960s, African nations were extremely cautious about organized commerce and investment. During the 1980s, several nations imposed trade restrictions and capital controls as part of import-substitution industrialization policies aimed at conserving scarce foreign exchange. This inward-looking strategy discouraged FDI and had negative impacts on economic growth and living

conditions [35]. Since the mid-1990s, however, there has been relative improvement in economic performance in some African countries due to a policy shift towards outward-looking strategies [5].

Table 2. Africa's Net Foreign Direct Investment Inflows (USD Million)

Year	Africa Total	Nigeria (USD M)	% of Africa Total	% of Nigeria GDP
1990	2,430	588	24.19	1.81
1995	5,119	1,079	21.07	3.87
1997	10,667	1,539	14.43	3.89
1998	8,928	1,051	11.77	2.92
1999	12,231	1,005	8.22	2.91
2000	8,489	930	10.96	2.39
2001	18,769	1,104	5.88	2.39
2002	10,998	1,281	11.65	3.93
2003	15,033	1,200	7.98	1.91
2005	20,562	1,800	8.75	2.89
2006	20,434	2,207	10.80	2.05
2007	30,150	2,598	8.61	2.19
2008	39,788	1,879	4.72	2.43
2009	37,633	2,429	6.45	2.93
2010	33,941	2,325	6.85	1.65
2011	44,125	2,260	5.12	2.15
2012	46,927	2,260	4.81	1.53
2013	42,056	3,180	7.56	1.08
2014	45,632	1,408	3.08	0.81
2015	46,144	1,380	2.99	0.63
2016	32,807	1,478	4.50	1.09
2017	26,593	1,501	5.64	0.93

Source: UNCTAD Foreign Direct Investment Database Online (2003)

Africa's FDI increased from USD 8,928 million in 1998 to USD 12,231 million in 1999. Its share of world imports declined from 4.6% to 2.2% between 1980 and 2003 [30]. In 2018, FDI flows to Africa defied the global downward trend and rose to USD 46 billion — an 11% increase after successive declines in 2016 and 2017. Reduced flows to major economies including Nigeria, Egypt, and Ethiopia were offset by large increases elsewhere, most significantly in South Africa. Growing commodity demand and prices, as well as sustained non-resource-seeking investments in a few countries, were largely responsible for the increase.

Three key realities must be recognised when designing FDI promotion strategies for Africa. First, FDI requires long-term commitment, involves high sunk costs, and is difficult to reverse in the short run, making entry decisions highly sensitive to investment environment uncertainty [36]. Second, foreign investors perceive Africa as a high-risk investment region, with economic and political risks highly contagious due to the interconnected nature of African economies [37]. Third, the competition for FDI among developing countries has intensified with globalisation [38].

2.6 FDI and Economic Growth in Nigeria

Several studies have examined FDI and economic development in Nigeria with varying results. Odozi (1995) documented that the macroeconomic policies in place before Nigeria's Structural Adjustment Programme (SAP) were discouraging foreign investors, leading to expansion of parallel markets and sustained capital flight [39]. Ariyo (1998) studied investment patterns and their effects on Nigeria's economic development over 1970–1995, finding that private investment consistently added to raising economic growth, and recommending institutional revamp to secure the interests of significant stakeholders [40].

Nigeria's share of FDI inflow into Africa averaged around 10%, declining from 24.19% in 1990 to a low of 5.88% in 2001 before rising to 11.65% in 2002. Solomon and Eka (2013) investigated FDI and economic growth in Nigeria over 1981–2009 using OLS. Their results indicated that FDI had a positive but insignificant impact on Nigerian economic growth, attributing this to the enclave character of oil-sector FDI [38].

Akinlo (2004) confirmed a positive relationship between FDI and growth in Nigeria but noted that the absorptive capacity of human capital conditions the efficiency of FDI spillovers [41]. Olokoyo (2012) provided further evidence of positive growth effects from FDI [42]. The present study extends this literature to 2018 and simultaneously models exchange rate and export channels within a unified ECM framework.

3. METHODOLOGY

3.1 Research Design

This study is based on a cross-sectional time-series survey covering the period 1981–2018. The econometric model used is the multiple regression analysis of the Ordinary Least Squares (OLS) method. The choice of OLS was adopted because it effectively determines the relative influence of one or more predictor variables on a criterion variable. The study aims to determine the relationship between FDI, exchange rate, exports, and economic growth as proxied by Gross Domestic Product.

3.2 Method of Data Collection

Secondary data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin on Exports, Annual Reports and Statements of Accounts. The models are estimated using data on FDI and macroeconomic indicators including Real Gross Domestic Product (RGDP), Exchange Rate (EXR), and Exports (EXP) for the period 1981–2018.

3.3 Model Specification

The Complete Model examines the relationship between FDI and economic growth in Nigeria between 1981–2018. RGDP, the dependent variable, is measured as a function of the independent variables EXP, FDI, and EXR. The functional form is:

$$RGDP = F(FDI, EXP, EXR) \quad ... (1)$$

The OLS linear regression equation based on this functional relation is:

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \mu \quad ... (2)$$

Which can be further written in linear form as:

$$RGDP = FDI + EXP + EXR + \mu \quad ... (3)$$

Where:

RGDP = Real Gross Domestic Product

FDI = Foreign Direct Investment

EXP = Exports

EXR = Official Exchange Rate

μ = Error Term

The dependent variable, RGDP, shows the rate of economic growth and serves as a proxy for investment development. FDI enters the model because foreign direct investment flows to countries that pay higher returns on capital, and a higher GDP implies higher prospects for FDI. EXP is included because a nation's RGDP will increase with higher export earnings. EXR is included because a higher exchange rate will attract low FDI while a competitive rate signals economic health and may attract FDI.

The model is logarithmically transformed to reduce heteroscedasticity and to allow elasticity interpretation of coefficients. In log form with a one-period lag structure:

$$\log RGDP(t-1) = \alpha_0 + \alpha_1 \log FDI(t-1) + \alpha_2 \log EXP(t-1) + \alpha_3 EXR(t-1) + \varepsilon(t-1) \quad ... (4)$$

The a priori expectations are $\alpha_1 > 0$, $\alpha_2 > 0$, and $\alpha_3 > 0$, consistent with the theoretical prediction that FDI, exports, and a competitive exchange rate each stimulate output growth.

3.4 Test for Stationarity

To avoid spurious regression results from non-stationary series, the characteristic of time-series data is examined using the Augmented Dickey–Fuller (ADF) test. Dickey and Fuller (1981) defined regression results from non-stationary data as 'spurious' or 'nonsense' regressions, because inferences from such results can be misleading [43]. The ADF test is used in preference to the basic DF test, which assumes that the data generating process is an AR(1) process and is therefore vulnerable to autocorrelation bias. The ADF test regression is:

$$y\_t = \alpha_0 + \alpha_1 Y\_(t-1) + \Sigma\, r\_k\, \Delta y\_(t-k) + \varepsilon\_t$$

Where k = length of lag on the dependent variable necessary to make ε white noise.

The decision rule is:

i. The null hypothesis is $\alpha_1 = 1$, i.e., the variable has a unit root (non-stationary).

ii. The alternate hypothesis is $\alpha_1 = 0$, i.e., the variable is stationary or integrated of order I(0).

iii. A large negative value for α_1 leads to rejection of the null hypothesis.

iv. The null hypothesis is rejected or accepted on the basis of the t-statistic on α_1 compared with MacKinnon (1996) critical values.

The ADF test was carried out on both the levels and first differences of the variables to determine their order of integration. The sample size for the time series lies between 25 and ∞, satisfying the ADF test requirement.

3.5 Co-integration and Error Correction Model

Even though individual series in the model may not be stationary at level form, their linear combination may be stationary — i.e., co-integrated — implying a long-run equilibrium relationship between dependent and independent variables. The Augmented Engle–Granger (AEG) co-integration test is applied to residuals (μt) from the long-run OLS equation, subjecting them to ADF testing:

$$\Delta\mu_t = \delta\mu_{(t-1)} + \Sigma\, \alpha_i \Delta\mu_{(t-i)} + \ell_t$$

Where μ = generated residual series and ℓt = pure white noise error.

The hypothesis tested is:

H_0: $\delta = 0$ (no co-integration)

H_1: $\delta \neq 0$ (co-integration exists)

If co-integration is confirmed, an Error Correction Model (ECM) is estimated to capture both the short-run dynamics and the speed of adjustment of RGDP back to long-run equilibrium following a shock.

4. DATA PRESENTATION, ANALYSIS, AND DISCUSSION

4.1 Unit Root Tests

Time-series data are often non-stationary; unit root tests are therefore necessary to ensure that the data is stationary and to avoid spurious regression. The ADF test was employed on all variables. The decision rule is that ADF statistics must be greater than the MacKinnon critical value (in absolute terms) at 10%, 5%, or 1% before a variable can be adjudged stationary; otherwise the null hypothesis of non-stationarity is accepted.

Results showed that the variables are not stationary at levels, meaning the null hypothesis of unit root cannot be rejected. After transforming all variables to first differences, the null hypothesis is rejected and all variables become stationary. Tables 3–6 present the results.

Table 3. ADF Unit Root Test — D(LOG RGDP)

Test	t-Statistic	Prob.*
ADF Test Statistic	−1.4174	0.0009
1% Critical Value	−3.4599	—
5% Critical Value	−2.8744	—
10% Critical Value	−2.5737	—
Durbin–Watson Stat	1.9950	—

*Null: D(LOG RGDP) has a unit root. Exogenous: Constant. *MacKinnon (1996) one-sided p-values.*

Table 4. ADF Unit Root Test — D(LOG EXR)

Test	t-Statistic	Prob.*
ADF Test Statistic	−4.7813	0.0009
1% Critical Value	−3.7379	—
5% Critical Value	−2.9919	—
10% Critical Value	−2.6355	—
Durbin–Watson Stat	1.9950	—

Null: D(LOG EXR) has a unit root. Exogenous: Constant.

Table 5. ADF Unit Root Test — D(LOG EXP)

Test	t-Statistic	Prob.*
ADF Test Statistic	−4.7813	0.0009
1% Critical Value	−3.7379	—

5% Critical Value	−2.9919	—
10% Critical Value	−2.6355	—
Durbin–Watson Stat	1.9950	—

Null: D(LOG EXP) has a unit root. Exogenous: Constant.

Table 6. ADF Unit Root Test — D(LOG FDI)

Test	t-Statistic	Prob.*
ADF Test Statistic	−5.6124	0.0001
1% Critical Value	−3.7379	—
5% Critical Value	−2.9919	—
10% Critical Value	−2.6355	—
Durbin–Watson Stat	1.9487	—

Null: D(LOG FDI) has a unit root. Exogenous: Constant.

Tables 3 to 6 show results of tests for stationarity and autocorrelation after transformation to first differences. The computed ADF test statistics for all variables — RGDP, EXR, EXP, and FDI — are smaller than the critical values at 1%, 5%, and 10% significance levels (in absolute terms), confirming stationarity in first differences. The Durbin–Watson statistics are approximately 2 in all cases, confirming the absence of autocorrelation problems in the time-series data and the reliability of the results.

4.2 Co-integration Test

Even though individual series are non-stationary at level form, their linear combination may be stationary at level form, indicating co-integration — i.e., a long-run relationship between the variables. The Augmented Engle–Granger (AEG) co-integration test is used, which subjects residuals from the co-integrating regression to ADF unit root testing.

Table 7. Results of Co-integration Test

Variable	ADF Statistic	1% Critical	5% Critical	10% Critical
Residual (μt)	−4.1455	−3.6228	−2.9446	−2.6105

The ADF statistic of −4.1455 for the residual series exceeds the 5% MacKinnon critical value of −2.9446 in absolute terms. The null hypothesis of no co-integration ($\delta = 0$) is therefore rejected, confirming that there exists a long-run equilibrium relationship among the variables RGDP, FDI, EXR, and EXP.

4.3 OLS Regression Results

Table 8. OLS Regression Result — Dependent Variable: D(LOG RGDP(−1))

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	−0.839028	0.082914	11.47880	0.0000
D LOG EXR(−1)	0.062070	0.005845	1.26203	0.0057
D LOG EXP(−1)	0.521070	0.086107	2.54458	0.0096
D LOG FDI(−1)	0.481460	0.005627	2.03268	0.0094

R-squared	0.6082	Mean dependent var	3.791134	
Adj. R-squared	0.5735	S.D. dependent var	1.252650	
S.E. of regression	0.5300	Akaike criterion	1.676179	
Sum sq. resid	6.4600	Schwarz criterion	1.821344	
Log likelihood	−0.4903	Hannan-Quinn crit.	1.717981	
F-statistic	58.3337	Durbin–Watson stat	1.6081	
Prob(F-statistic)	0.0004	Observations	38	

Method: OLS. Sample: 1981–2018. Software: Gretl 1.7.1.

The coefficient of multiple determination R^2 of 0.61 (61%) indicates that the explanatory variables — FDI, EXP, and EXR — account for 61% of total variations in the dependent variable GDP. This is a good fit for a parsimonious macroeconomic model. Considering the degree of freedom, the adjusted R^2 of 0.57 shows that 57% of the dependent variable is explained by the explanatory variables. The F-statistic (58.33, prob. = 0.0004) confirms that the explanatory variables are jointly significant in explaining the variation in GDP.

4.3.1 Exchange Rate (EXR)

The impact of exchange rate is positive and significant (coefficient of EXR = 0.062, t-value = 1.262, p = 0.0057). This indicates that exchange rate has a positive and significant impact on RGDP. The probability value of 0.0057 confirms the significance of this impact. The output elasticity of EXR was 0.37, meaning that over the study period, holding other variables constant, a 1% increase in the exchange rate leads on average to approximately 36.9% increase in output growth.

While the positive sign does not conform to the standard theoretical postulation — which predicts that as the foreign currency appreciates against domestic currency, exports become cheaper and net exports rise, boosting GDP — it can be explained by the dominance of oil export receipts, which rise in naira terms with depreciation, and the significant role of the parallel (black) market exchange rate in the Nigerian economy, which is not captured in official statistics. The economic impact of EXR on RGDP is statistically significant though economically moderate, reflecting the distortion caused by the foreign exchange parallel market [9].

4.3.2 Exports (EXP)

The impact of net export earnings was positive and significant (coefficient of EXP = 0.521, t-value = 2.545, p = 0.0096). This indicates that export performance has a significant and positive impact on RGDP of Nigeria. The output elasticity of EXP was 0.275, implying that over the study period, on average, a 1% increase in the degree of net exports leads to approximately 27.5% increase in output growth.

This early-stage increase in output growth as a result of openness to trade may be attributed to internal vibrancy of government objectives, development of infrastructure, and the oil boom of the 1970s. The result is consistent with the Export-Led Growth hypothesis and supports the null hypothesis rejection H_{02}.

4.3.3 Foreign Direct Investment (FDI)

The production function exhibits satisfactory results in terms of correct signs and statistical significance for the explanatory variables. The coefficient of FDI shows a correct positive sign (coefficient = 0.481, t-value = 2.033, p = 0.0094), with an output elasticity of 0.213. This indicates that, over the study period, holding export earnings and exchange rate constant, a 1% increase in FDI leads on average to approximately 21.3% increase in output growth, and output growth in the Nigerian economy is thereby achieved.

However, several factors have historically been responsible for poor FDI performance in Nigeria, explaining why FDI's impact, while positive and significant, remains below its potential. These factors include: (1) Uncertainty due to political instability, macroeconomic instability, and lack of policy transparency; (2) Inhospitable regulatory environment; (3) Poor infrastructure; (4) High protectionism; (5) High dependence on commodities; (6) Increased international competition for FDI; (7) Corruption and weak governance; and (8) Poor and ineffective marketing strategy. The Durbin–Watson statistic of approximately 2.0 suggests the absence of first-order serial correlation and indicates that no important variable has been omitted from the theoretical specification of the model. The statistical result at the 5% significance level confirms that the hypothesis that FDI is positively related to output growth cannot be rejected — supporting H_{01} rejection.

4.4 Error Correction Model

The ECM captures the short-run dynamics and the speed of adjustment to long-run equilibrium. In the ECM, all variables conform to the a priori expectations and are statistically significant. The Error Correction Mechanism (ECMt−1) coefficient is negative, conforming to the theoretical requirement.

The coefficient of −0.785507 implies that approximately 79% (0.785507 × 100%) of the equilibrium error will be corrected in the next period; i.e., RGDP will adjust to equilibrium by about 79% in the next period. The speed of adjustment is sufficiently high to correct macroeconomic imbalances effectively.

The short-run coefficient of differenced EXR (0.013803) implies that a 1% rise in exchange rate will lead to approximately 1.38% increase in RGDP. The differenced EXP coefficient (-9.41×10^{-5}) indicates that a 1% increase in net export leads to a minute decline in RGDP of about 0.009% — negligible in practical terms. A 1% increase in FDI leads to approximately 4.07% increase in RGDP in the short run, and this result is statistically significant.

These results are broadly consistent with Bailliu, Lafrance, and Perrault (2012); Kyereme (2014); and Rano-Aliyu (2017). They contradict Akpan and Atan (2015), whose work found money supply and the lag of exchange rate to be significant in explaining FDI movement. The Durbin–Watson statistic confirms absence of first-order serial correlation, indicating that the result is not a product of model misspecification.

4.5 Policy Implications of Findings

This result confirms previous evidence obtained for other countries and accords with the Endogenous Growth Hypothesis. The results also reflect the effect of high GDP growth rates experienced during much of the study period on the pace of FDI flows into Nigeria. In contrast to many developing countries, Nigeria has abundant resources and domestic investment that could finance development. However, FDI has great potential to yield higher growth through higher efficiency in physical and human capital and through positive externalities such as technology diffusion and the introduction of alternative management practices.

While most African countries have begun privatising state-owned enterprises and opening telecommunications, airlines, tourism, and some industries to private investment, more effort is needed to decrease government involvement in markets and provide better incentives and institutional requirements for private investment.

Empirical studies suggest that capital inflows are more beneficial and create fewer problems when they are long-term and in the form of direct investment, induced by growth prospects, and invested in physical rather than consumption assets [44]. Short-term portfolio investment is often associated with increased consumption and financial system fragility. It is therefore important for Nigeria to improve the quality of FDI it attracts and to be selective in the types of investment it encourages. Maintaining a steady stream of foreign capital flows and minimising fluctuations in FDI inflows is a key policy priority [44].

The recent pattern of FDI flows into Nigeria has been heavily concentrated in the oil sector. Attracting FDI to the extractive sector has proved less growth-enhancing than investment in other productive sectors [41], given oil's enclave character and limited backward and forward linkages with the broader economy. Growth enhancing policies coupled with sound macroeconomic policies foster healthy returns to investment and thereby attract FDI. Nigerian leaders should establish investment agencies, improve the local regulatory environment, develop local financial markets, and enhance transparency in macroeconomic policies.

5. SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary of Findings

This study appraised the impact of foreign direct investment on economic growth using empirical data by examining the trend of FDI and economic growth and making appropriate policy recommendations.

Unit root tests confirmed that all variables — RGDP, EXR, EXP, and FDI — are integrated of order one, I(1), with ADF statistics smaller than MacKinnon critical values at 1%, 5%, and 10% significance levels before differencing, and Durbin–Watson statistics approximately equal to 2, confirming the absence of autocorrelation problems.

The co-integration test confirmed a long-run equilibrium relationship among the four variables. The OLS regression results showed that: (i) exchange rate has a positive and significant impact on RGDP ($p = 0.0057$); (ii) export earnings have a positive and significant impact on RGDP ($p = 0.0096$); and (iii) FDI has a positive and significant impact on RGDP (coefficient = 0.4815, t-value = 2.033, $p = 0.0094$). The R^2 of 0.608 indicates that 58% of variations in the dependent variable were explained by the explanatory variables. The probability of F-statistic (0.0004) confirms that the overall regression is significant and passes the goodness-of-fit test.

ECM results showed that all variables conform to a priori expectations and are statistically significant. The ECMt−1 coefficient of −0.785507 implies that approximately 79% of the equilibrium error is corrected within one period. In the short run, a 1% rise in exchange rate leads to a 1.38% increase in RGDP; a 1% increase in FDI leads to a 4.07% increase in RGDP; and a 1% increase in net exports leads to a negligible 0.009% decline in RGDP.

5.2 Conclusion

As an empirical study on FDI and economic growth in Nigeria, this study has attempted to understand the relationship and interaction between these variables. The proxy for economic growth used was real GDP, and the study focused on the period 1981–2018 using time-series data obtained from the CBN, World Bank, and Federal Office of Statistics. Ordinary Least Squares, unit root, co-integration, and Error Correction Model analyses were used to test for correlation and short and long-run dynamics.

The results show a long-run relationship between the variables and that the direction of flow is from FDI to growth, implying that part of Nigeria's historical economic growth is attributable to FDI inflows. The findings bridge existing information gaps and enable policymakers to plan and formulate both short and long-term policies from an informed perspective.

For a country like Nigeria, attracting FDI is of paramount importance given its positive multiplier benefits. However, policymakers must be aware of risks associated with excessive FDI beyond absorptive capacity, such as exchange rate destabilisation and other macroeconomic vulnerabilities.

The Nigerian economy underwent structural reform with the SAP launched in the 1980s. The main objectives can be summarised as: (i) minimising state intervention; (ii) establishing a free market economy; and (iii) integrating the economy with the global economic system. This liberalisation process has enabled Nigeria to take its place in the global economy, though further structural reforms are necessary.

5.3 Recommendations

Based on the foregoing findings and conclusions, the following recommendations are made:

1. Domestic Actions — Image Building and Regulatory Reform: Improving Nigeria's currently adverse image is key to reversing the dismal FDI trend. This requires increasing political stability, macroeconomic stability, domestic regulatory reforms, and marketing of investment opportunities. An enabling environment must be created before investment opportunities can be effectively marketed to foreign entrepreneurs.
2. Support Existing Investors: Improving the investment climate for existing domestic and foreign investors through infrastructure development and provision of services will encourage increased investment and attract new investors. For domestic investors, an improved climate will also reduce capital flight.

3. Targeted Investment Promotion Strategy: Experience has shown that over-reliance on Investment Promotion Agencies (IPAs) has not been very effective in Africa. Nigeria should identify sectors where it has comparative and competitive advantages and promote FDI into those sectors selectively — making investment promotion more cost-effective and impactful. Studies show that existing investors play a very important role in attracting new investors to a location.
4. Economic Diversification: Several African countries rely on the export of a few primary commodities for foreign exchange earnings, exposing them to significant terms-of-trade shocks. Diversification will enable Nigeria to cushion these shocks and reduce country risk, thereby increasing the attractiveness of the economy to FDI in the secondary and tertiary sectors. To spread and sustain growth, the evidence points to three key objectives: avoiding growth collapses, accelerating productivity growth, and increasing private investment — achievable by expanding the range of firms and farms that can compete globally.
5. Improving the Investment Climate: This requires reducing indirect costs to firms, with energy and transportation topping the list of major impediments. It also requires reducing and mitigating risks relating to crime, property insecurity, political instability, and macroeconomic volatility. Spurring innovation through investment in information technology and higher education is also essential, as the potential comparative advantage of Nigeria's low wages is too often nullified by low productivity.
6. FDI Quality and Monitoring: A robust and efficient mechanism for monitoring and recording FDI flows should be established to enable accurate decisions, forecasts, and research by policymakers, academics, and stakeholders. Nigeria should improve on its efforts to combat corruption through strengthening agencies such as the EFCC and ICPC, demonstrating to both foreign and domestic investors that Nigeria is a safe and reliable investment destination.
7. Greater Policy Sensitivity on Trade Openness: There is a need for guided training and integration of human resources to enable Nigerians to contribute positively to economic growth in both foreign and indigenous firms across all sectors. Nigerian leaders should also ensure that the principles enshrined in the New Partnership for Africa's Development (NEPAD) are implemented, as this has the potential to improve economic policymaking quality and the investment climate.
8. Regional Coordination: Nigeria should work with other African countries to design and formulate adequate policies to attract stable investment flows, taking policy measures that substantially enlarge and diversify the economic base and improve human capital. Monetary cooperation and support for regional capital markets are needed to coordinate cross-border infrastructure and investment promotion at both national and regional levels — consistent with the NEPAD and African Continental Free Trade Area (AfCFTA) frameworks.

APPENDIX I: RAW DATA (1981–2018)

Table A1. Annual Data for GDP, FDI, Exchange Rate, and Exports — Nigeria (1981–2018)

S/N	Year	GDP (₦ million)	FDI (₦ million)	EXR (₦/$)	EXP (₦ million)
1	1981	137.3	47,619.70	0.61	1,188,969.80
2	1982	1,624.90	49,069.30	0.6729	1,945,732.30
3	1983	556.7	53,107.40	0.7241	1,867,953.90
4	1984	534.8	59,622.50	0.7649	1,867,953.90
5	1985	329.7	67,908.60	0.8938	1,867,953.90
6	1986	2,499.60	69,147.00	2.0206	1,867,953.90
7	1987	680.0	105,222.90	4.0179	1,867,953.90
8	1988	1,345.60	139,085.00	4.5367	5,752,747.79
9	1989	−439.4	216,707.50	7.3916	6,838,888.94
10	1990	−464.30	267,550.00	8.0378	70,530,650
11	1991	1,808.00	312,139.80	9.9095	6,808,831
12	1992	8,269.20	532,613.80	17.2984	6,764,450
13	1993	32,994.40	683,869.20	22.0511	2,011,317
14	1994	3,907.20	899,863.20	21.8861	2,011,317
15	1995	48,677.00	1,933,211.60	21.8861	1,646,175
16	1996	2,731.00	2,702,719.10	21.8861	9,506,614
17	1997	5,730.90	2,801,972.60	21.8861	13,095,434
18	1998	24,078.80	2,708,430.90	21.8861	12,416,627
19	1999	1,779.10	3,194,023.60	92.6934	7,518,567
20	2000	3,347.00	4,537,637.20	102.1952	11,889,698
21	2001	3,377.00	4,685,912.20	111.9433	19,457,233

22	2002	8,205.50	5,403,006.80	120.9702	18,679,539
23	2003	13,056.50	6,947,819.90	129.3565	17,441,777
24	2004	19,909.10	11,411,066.90	133.5004	30,878,864
25	2005	25,881.80	14,610,881.50	132.147	46,027,815
26	2006	41,470.80	15,564,594.70	128.6516	72,465,348
27	2007	54,041.90	23,280,715.00	125.8331	73,246,806
28	2008	56,177,634	7,950,661.40	129.3565	81,201,479
29	2009	57,317,645	162,788.80	133.5004	97,745,109
30	2010	57,692,481	9,106,626.50	132.1470	84,064,464
31	2011	57,062,586	8,861,514.27	131.4330	87,670,351
32	2012	62,949,090	8,861,415	128.6516	2,982,948,227
33	2013	61,474,865	5,113,28.02	130.7438	1,051,561,014
34	2014	54,041,901	2,984,220.50	133.21856	1,985,022,144
35	2015	41,470,800	5,143,151.20	133.88165	2,080,235,203
36	2016	75,881,780	200,710,257	134.63124	3,087,886.40
37	2017	91,909,110	2,116,858.10	136.52314	32,080,235
38	2018	113,056,450	1,710,445,717	136.55124	12,800,856

Source: Central Bank of Nigeria Statistical Bulletin; World Bank; IMF International Financial Statistics.

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