

Vector Error Correction Analysis of Foreign Direct Investment and its Effect on the Performance of Nigerian Economy (1990-2018)

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Abstract: The study evaluated the Vector Error Correction analysis of foreign direct (FDI) investment and its effect on the performance of Nigerian economy; for the period 1990-2018. Secondary data were used and collected from Central Bank of Nigeria Statistical Bulletin. The study used Gross Domestic Product as the dependent variable to measure economic performance; whereas, Exchange Rate, Foreign Direct Investment and Inflation Rate respectively were employed as the explanatory variables. The result confirmed that about 78% short-run adjustment speed from long-run disequilibrium. The study revealed that foreign direct investment had a significant effect on Gross Domestic Product in Nigeria. Exchange rate was positive; but had an insignificant effect on Gross Domestic Product in Nigeria. Inflation rate had an insignificant effect on Gross Domestic Product. The coefficient of determination indicated that about 64% of the variations in economic growth can be explained by changes in foreign direct investment variables in Nigeria. The study concluded that foreign direct investment had significantly affected the growth and development of the Nigerian economy. The study recommended that the Government and policy makers should provide adequate infrastructure and policy framework that will be conducive for doing business in Nigeria, so as to attract inflow of FDI. The policy makers and government should formulate policies that will be favorable to local investors in order to complement the inflow of investments from abroad. Government should improve the investment climate in order to encourage domestic and foreign investors through infrastructure development.

Keywords: VECM Analysis, Foreign Direct Investment, Economic, Performance, Nigeria.

1. INTRODUCTION

Nigeria as one of the developing countries of the world has adapted a number of strategies aimed at accelerating growth and development of the domestic economy; thus, one of such is to attract foreign direct investment (FDI) into the country. Study by Andabai and Igbodika (2018) posited that in a globalized world no country is self-sufficient, indeed economies all over the world are expected to linked directly or indirectly together. Thus, this relationship is also made possible through foreign direct investment. The work of Uguegbe (2017) viewed foreign direct investment as a catalyst for growth and development in any modern economy; because, it stimulates domestic investment through increase in capital formation and facilitating technology transfer in the host countries. Hence, as a result, foreign direct investment has been considered as one of the most important sources of external inflow to the Nigerian economy over the years (Legbosi, 2017). The work of Ogbek (2018) revealed some potential advantages of the foreign direct investment to the host economy as: to facilitates the utilization and exploitation of local raw material, introduces modern techniques of management and marketing, eases the access to new technologies, foreign direct investment inflow can be used for financing current account deficit etc. Study by Togbuko(2018) stated that government have been trying to lift the country out of the economic doldrums without achieving success as desired. One of the major constraint identified by the work of Ogbekundu (2018) is inadequate savings needed for the required investment. Hence, foreign direct investment is needed to reduce the difference between the desired gross domestic investments and domestic savings in an economy.

The work of Jehu and Ogubunka (2018) stressed that foreign direct investments include: mergers and acquisitions, building new facilities, reinvesting profits earned from overseas operations and intra company loans. Empirical study by Legbosi (2017) revealed that foreign direct investment aids the inflow of technology and skills and fills the gap between domestically available supplies of savings, foreign exchange and government revenue. The study conducted Udoh and Egwaikhide (2016) stated that the major FDI inflow into the country goes to the oil sector of the economy; which appears to be undermining the relevance of investing in the non-oil sector, leaving the economy in a mono-cultural and import dependent nation. Hence, prior to the discovery of oil in commercial quantity in Nigeria, the non-oil sector such as the agricultural and the manufacturing sector were the pillar of Nigerian economy and accounted for about 90% of foreign earnings in the economy (Andabai & Ikeora, 2018). This explained the huge inflow of foreign direct investment into the sectors that gave rise to some manufacturing firms such as Coca-Cola, UAC and Leventis etc. Hence, the neglect of the real sector occasioned by the oil boom led to the huge inflow of foreign direct investment to the oil sector at the expense of the non-oil sector in Nigeria. Thus, the importance of the non-oil sector cannot be over emphasized in achieving growth and development of any modern economy.

2. THEORETICAL FRAMEWORK

The theoretical framework of this study is predicated on the foreign direct investment theory. The theory plays a significant role in the international economy. In the second world most of the investments were of portfolio; and as at that period, about 90% of British investments were in France and Germany. Exchange then were negligible and political situation were stable, these international portfolio investments were governed by interest rate differential. Hence, a distinct feature of direct investment is that investors want to control over the investments. The work of Buchi and Kolunbo (2018) posited that one of the main determinants of FDI is technological superiority or superior managerial skills. A firm under monopolistic or oligopolistic market condition may develop some new product or new product technology it wants to make use of its innovation to increase its possibility of making profit from its superior technology. Therefore, it may be decided on entering a foreign market, the way to do this is by way of foreign direct investment. However, Basu and Srinivasan (2017) posited that the activities of FDI are often two sided operations, for example, U.S.A can make direct investment in Europe; while, Western Europe can also make direct investment in USA. Though United States seems to have the most developed technology, because, the country has the most developed technology in all sectors of the economy. For example, German and Swedish industrial technology are also sophisticated compare to the American counterpart. This had made German and Swedish industries to engage in direct investment in the United States. This is an improvement in balance of payment on the long run. However, the effect could be negative from a real point of view; the effect could also be beneficial as long as the positive effect on economic growth. The adverse effect of host country FDI is that it may stifle scientific research and development work in the host country. It also could lead to exploitation especially for less developed countries (Markusen & Venables, 2018).

2.1. Empirical Review

Asiedo (2003) used panel data for 22 countries in sub-Saharan African over the period of 1984-2000 to examine the impact of political risk, institutional framework and government policy on the FDI inflows. The dependent variable was the rate of FDI net flows to GDP while the independent variable used include: natural resource intensity, attractiveness of the host country's market, infrastructural development, macro-economic instability, openness to FDI, host country institution and political instability. The results showed that macro-economic stability, efficient institution, political stability and goods regulatory framework have positive impacts on FDI.

Ayanwale (2017) investigated the empirical relationship between non-extractive FDI and economic growth in Nigeria. Using OLS estimates, the study found that FDI led growth for Nigeria, Sri Lanka, Tunisia, and Egypt; and based on weak cointegration tests, a long run causality between FDI and economic growth running in both directions was found for the same set of countries. Johansen cointegration framework and a multivariate VAR within a vector error correction model, found evidence of long-run equilibrium relationship between economic growth. Buchi and Kolunbo (2018) used cointegration analysis and a Vector Error Correction (VEC) models to examine the relationship between

Foreign Direct Investment (FDI) and economic growth in Nigeria. The results show that FDI inflows play a pivotal role in determining the short and long-run movement of economic growth through capital accumulation. However, a FDI inflow was found to have a negative effect on the economy.

Akunde (2017) examined the impact of real exchange rate on the growth of non-oil export in Nigeria. The study showed the effect of real exchange rate misalignment and volatility on the growth of non-oil exports. The study observed that irrespective of the alternative measures of misalignment employed, both real exchange misalignment and volatility adversely affected growth of non-oil exports. Eme and Johnson (2012) investigated the effect of exchange rate movements on real output growth in Nigeria for the period of 1986-2010. The result revealed that there is no evidence of a strong direct relationship between changes in exchange rate and output growth. Rather, Nigeria economic growth has been directly affected by monetary variables.

Udoh and Egwaikhide (2016) examined exchange rate volatility, inflation uncertainty and foreign and foreign direct investment in Nigeria from 1980-2015 using the GARCH model. The study found that RGDP, trade openness is positively related to FDI inflow while inflation uncertainty, exchange rate volatility, government consumption expenditure, political instability, domestic credit to private sector and foreign interest rate are negatively related to FDI inflow to Nigeria.

3. METHODOLOGY

The study employed *ex-post-facto* research design. Secondary data were used and collected from Central Bank of Nigeria Statistical Bulletin. The study used Gross Domestic Product as the dependent variable to measure economic Growth; whereas, Exchange Rate, Foreign Direct Investment and Inflation Rate.

3.1. Model Specification

Multivariate linear regression model is used to test the hypotheses proposed for this study. Based on this, a model is adapted from the study carried out by (Jehu & Ogubunka, 2018)). The model is stated as: $GDP = f(FDI, EXR)$. Where: GDP = Gross Domestic Product as proxy for Economic Growth. EXR = Exchange Rate. The above model is modified in this study by introducing inflation rate and was employed as independent variable. Hence, the modified model was stated as: $GDP = f(FDI, EXR, INF)$(1)

The econometric model is stated as:

$$\ln(GDP) = a_0 + \ln a_1 FDI + \ln a_2 EXR + \ln a_3 INF + \mu \dots \dots (2)$$

Where: GDP = Gross Domestic Product, FDI = Foreign Direct Investment

EXR= Exchange Rate, INF= Inflation. $a_0 - a_3$ = constant parameters, μ = the error term, a_0 = intercept and a_1, a_2 and a_3 are the coefficients of the regression equation. μ is the stochastic or error term; while, Ln is the natural log of the variables. Log transformation is necessary to reduce the problem of heteroskedasticity; because, it compresses the scale in which the variables are measured, thereby reducing a tenfold difference between two values to a twofold difference (Gujarati, 2004).

4. DATA PRESENTATION AND DISCUSSION

The study centered on the effect of foreign direct investment on the performance of Nigerian economy; for the period 1990-2018. The study used Gross Domestic Product. as the dependent variable to measure economic Growth; whereas, Exchange Rate, Foreign Direct Investment and Inflation Rate respectively as the explanatory variables. respectively as indicated in appendix 1.

Table1: Descriptive statistics

	GDP	FDI	EXR	INFR
Mean	64868.39	54734.94	12.36450	27.25363
Median	33728.98	34856.45	16.86500	27.14370
Maximum	67953.76	72469.30	36.09000	45.10000
Minimum	25433.64	34337.59	9.250000	23.10000
Std. Dev.	6.113602	148.6905	5.409579	9.617132
Skewness	0.278525	3.111248	1.067069	0.175686
Kurtosis	3.075432	14.12640	5.256220	2.604247

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Jarque-Bera	0.372435	203.26433	12.36482	0.253744
Probability	0.776995	0.000000	0.003627	0.751799
Sum	162.3100	3173.310	596.4000	1486.929
Sum Sq. Dev.	1100.357	685374.4	907.1700	2835.166
Observations	29	29	29	29

Source: Author's computation with the use of E-view 9.1

The descriptive statistics on table 1 shows that Gross Domestic Product for the period under study had a mean value of ₦64,868, Foreign Direct Investment had ₦54,734 and Exchange Rate had 12.36%; while, inflation rate had 27.25%. The Jarque-Bera statistic shows that two of the variables, namely Gross Domestic Product and Foreign Direct Investment were normally distributed while Foreign Direct Investment and Exchange Rate were highly skewed. Hence, Gross Domestic Product has a mean of ₦64, 868 this implies that for the period under review the Gross Domestic Product was very high. This is because, foreign direct investment had significantly affected the growth and development of the Nigerian economy.

4.1. Unit Root Test

The stationary test of the variables was done using the Augmented Dicker Fuller (ADF) Unit Root Test. The result on **table 2** shows that all the variables are integrated at first difference i.e. 1(1) at the 5% or 1% level of significance.

Table2: Unit Root Tests Analysis

Variables	ADF test Statistics	Mackinnon critical vale @ 5%	No of the time difference	Remark
GDP	6.8564732	-8.735463	I(1)	Stationary
FDI	-3.9467385	-6.846578	I(1)	Stationary
EXR	-6.8493033	-3.756453	I(1)	Stationary
INF	3.7498565	6.856473	I(1)	Stationary

Notes: (1)1% level of significance, 5% level of significance, 10% level of significance. The tests accepted at 5% level of significance. **Source:** Researcher's Estimation using- E-views 9.1

4.2. Test for Co-Integration

Hence, having found that all the variables are stationary at first difference, the next step is to perform Johansen co-integration procedure to ascertain whether Gross Domestic Product (GDP), Foreign Direct Investment (FDI), Exchange Rate (EXR) and Inflation Rate (INF) are co-integrated in the same order. The results of the test are presented on table 3.

Table3: Multivariate Johansen's Co-Integration Test Result

Null hypotheses	Alternative hypotheses	Eigen value	Likelihood ratio	Critical vales 5%	Critical value 1%	Hypothesized No. of CE(s)
r=0	r=1	0.853686	68.83546	58.26	46.08	None **
rd _≤ 1	r=2	0.735409	52.86453	48.65	34.53	At most 1
rd _≤ 2	r=3	0.635735	48.25387	34.87	28.13	At most 2
rd _≤ 3	r=4	0.563783	34.86473	28.25	24.87	At most 3

Source: E-views Econometrics 9.1, Note* (**) denotes rejection of hypothesis at 5% (1%) significance level.

4.3. Vector Error Correction Model

The Error Correction coefficient contains information about whether the past values affect the current values of the variable under study and the significant coefficient implies that past equilibrium errors play a role in determining the current outcomes (Gujarati, 2004 & Ibenta, 2012).

Table4: Vector Error Correction Estimates Results

Dependent Variable: GDP

Method: Least Squares, Time: 05:50

Sample: 1990-2018

Included observations: 29

Date: 28/02/2019	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)	-0.782794	32.37843	3.336474	-0.000300
D(GDP ₋₁)	5.486756	2.048560	0.047553	0.000041
D(GDP ₋₂)	9.625345	5.253754	1.048572	0.000004
C	2.968574	1.947059	2.004755	-0.00050
Ln(FDI)	6.546742	0.756489	2.465874	0.001340
Ln(EXR)	8.364846	8.769506	0.254769	-0.00028
Ln(INFR)	7.871435	0.476994	2.364786	0.036452
R-squared	0.640134	Mean dependent var		263.8242
Adjusted R-squared	0.613985	S.D. dependent var		142.4637
S.E. of regression	12.35364	Akaike info criterion		15.13259
Sum squared resid	46583.10	Schwarz criterion		11.47569
Log likelihood	-34.13731	F-statistic		7.980566
Durbin-Watson stat	1.805767	Prob(F-statistic)		0.000000

Source: Author's computation with the use of E-view 9.1

The results on table 4 show that error-correction coefficient (-0.782794) is statistically significant and has a negative sign, which confirms a necessary condition for the variables to be co-integrated. Hence, there is also a long-run equilibrium impact of foreign direct investments on the performance of Nigerian economy; and, the result confirms that about 78% short-run adjustment speed from long-run disequilibrium. The coefficient of determination ($R^2=0.640134$) indicates that about 64% of the variations in economic growth can be explained by changes in foreign direct investment variables (FDI, INF and EXR) in Nigeria. This implies that a significant portion of economic growth is explained by changes of foreign direct (FDI) investment variables. The F-Statistics of (7.980566) which is significant at 5% confirms the effect foreign direct investment on economic growth in Nigeria; for the period 1990-2018. The influence of the explanatory variables on the dependent variable is statistically significant and this is also confirmed by the F-probability which is statistically zero.

4.4. Test of Hypotheses

H₀₁: There is no significant effect of foreign direct investment on Gross Domestic Product in Nigeria. Decision Criteria, Level of significance (α):0.05 (5%), Decision Rule, Reject H₀: If p- value < 0.05 and accept H₀ if p- value > 0.05. The results on table 4 show that foreign direct investment has a t-statistic of 2.465874 with a probability of 0.00134 which is lower than the level of significance of 0.05, which means, its effect is statistically significant. The null hypothesis is, therefore, rejected. Thus, foreign direct investment has a significant effect on Gross Domestic Product in Nigeria. **H₀₂:** There is no significant effect of exchange rate on Gross Domestic Product in Nigeria. Decision Rule, Reject H₀: If p- value < 0.05 and accept H₀ if p- value > 0.05, The results on table 4 show that exchange rate has a t-statistic of 0.254769 with a probability of -0.00028 which is lower than the level of significance of 0.05, which means, hence, its effect is negative; but statistically significant. The null hypothesis is, therefore, rejected. Thus, exchange rate is negative; but, has a significant effect on Gross Domestic Product in Nigeria. **H₀₃:** There is no significant effect of inflation rate on Gross Domestic Product in Nigeria. Decision Rule, Reject H₀: If p- value < 0.05 and accept H₀ if p- value > 0.05. The results on table 4 show that inflation rate has a t-statistic of 2.364786 with a probability of 0.036452 which is higher than the level of significance of 0.05, which means, its effect is statistically insignificant. The null hypothesis is, therefore, accepted. Thus, inflation rate has an insignificant effect on Gross Domestic Product in Nigeria

5. CONCLUSION AND RECOMMENDATIONS

The study concluded that foreign direct investment has a significantly affected the growth and development of the Nigerian economy. This was evident in the work of Ayanwale (2017), which indicated that there is a significant relationship between non-extractive FDI and economic growth in Nigeria. The study recommends that government policies should be focus on the stability of the economy. Government and policy makers should provide adequate infrastructure and policy

framework that will be conducive for doing business in Nigeria, so as to attract inflow of FDI. There is need for government to be formulating investment policies that will be favorable to local investors in order to complement the inflow of investment from abroad. The government and regulatory authorities in Nigeria should intensify efforts towards providing a conducive and enabling environment, inclusive of more reforms, for the sustained growth in foreign direct investment, given the significant effect of foreign direct investment on the performance of Nigerian economy. CBN and policy makers should adopt vibrant economic policies such as interest rate stability, flexible exchange rate, indigenization and economic diversification that will encourage the banks in financing the communication sector.

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Appendix1: Foreign Direct Investment and Economic Growth in Nigeria 1990-2018

Year	Foreign Direct Investment (₦ Billion)	Inflation Rate (%)	Exchange Rate (%)	GDP at Current Market Price (₦ Billion)
1990	45.7	20.9	48.442	472.65
1991	89.5	7.7	50.962	545.67
1992	143.2	23.2	54.365	875.34
1993	165.6	39.6	58.285	1,089.68
1994	162.8	5.5	60.826	1,399.70
1995	755.1	5.4	65.752	2,907.36
1996	562.6	10.2	83.695	4,032.30
1997	845.7	38.3	92.693	4,189.25
1998	837.4	40.9	102.105	3,989.45

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1999	862.5	7.5	111.943	4,679.21
2000	985.0	13	120.970	6,713.57
2001	1,358.2	44.5	129.356	6,895.20
2002	1,512.7	57.2	133.500	7,795.76
2003	2,080.2	57	131.661	9,913.52
2004	1,987.0	72.8	128.651	11,411.07
2005	2,800.9	29.3	134.054	14,610.88
2006	3,108.5	8.5	132.372	18,564.59
2007	3,912.0	10	132.601	20,657.32
2008	5,593.2	6.6	128.270	24,296.33
2009	5,480.7	6.9	146.680	24,794.24
2010	8,164.0	18.9	150.20	54,612.26
2011	10,995.9	12.9	156.00	62,980.40
2012	9,766.6	14	171.200	71,713.94
2013	9,439.4	10.1	180.111	80,092.56
2014	10,538.8	11.5	44.527	89,043.62
2015	11,076.1	8.6	46.628	94,144.96
2016	11,613.4	6.6	32.23	92,488.01
2017	10,356.3	32.4	36.12	91,253.93
2018	12,595.6	17.34	36.54	101,253.934

Source: Central Bank Nigeria Statistical Bulletin, 2018.

Citation: Andabai Priye Werigbelegha, Mary Ann Nwamaka Igbodika. "Vector Error Correction Analysis of Foreign Direct Investment and its Effect on the Performance of Nigerian Economy (1990-2018)" *International Journal of Managerial Studies and Research (IJMSR)*, vol 7, no. 3, 2019, pp. 22-28. doi: <http://dx.doi.org/10.20431/2349-0349.0603003>.

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