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Oil and Non-Oil Foreign Direct Investment and Economic Growth in Nigeria: An Empirical Evidence from Autoregressive Distributed Lag Model

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ABSTRACT

The paper examines the impact of both oil and non-oil foreign direct investment (FDI) on economic growth in Nigeria for the period 1980. An ARDL Approach to Cointegration and conditional EC Model was employed in order to ascertain the long-run and short-run relationships among the two categories of FDI (oil and non-oil), investment, export and economic growth. Bound cointegration test established that there is long run equilibrium relationship among the variables. Evidence from short run and long run elasticities shows that while non-oil FDI has positive effect on the growth of GDP, oil FDI exerts a negative effect on the economy and this may be due the high profit repatriation and low level of domestic employment in the subsector. The result further shows that domestic investment has significant positive effect on economic growth, the coefficient of export is also positive although insignificant. Generally, this suggests that economic growth in Nigeria over the period under study is driven by increasing inflows of FDI in the non-oil sectors, real export of goods and services and increased domestic investment.

Keywords: FDI, Oil and non-oil FDI, Economic growth, ARDL

1. Introduction

Foreign Direct Investment (FDI) has long been a burning topic of great interest and debate in several economies around the world. In the literature, there are many reasons as to why FDI has become a much-discussed topic of interest by scholars and policy makers. One is the dramatic increase in the annual global capital flow between 1985 to 2013, from around \$60 billion to an estimated \$1.45 trillion, resulting in the projection that FDI flows could rise to the tune of \$1.6 trillion in 2014, \$1.7 trillion in 2015 and 1.8 trillion (World in 2016 Trade Organization, 1996; United Nations Conference on Trade and Development, 2014). The keen interest in FDI is also part of a broader interest in the forces propelling the ongoing global integration of the world economy. The spectacular and diverse forms of FDI during the last three decades represented an importance force generating greater economic integration (Patibandla, 2014; Sethi and Sucharita, 2009; Mody, 2004; WTO, 1996). FDI is also viewed as a way of increasing the efficiency with which the world's scarce resources are used. Specifically, it brought in capital to capital-scarce economies (Tekin, 2012; Egbo et al., 2011; Mody, 2004; WTO, 1996).

Developing countries in sub-Saharan Africa and specifically Nigeria has been one of the main receipts of FDI particularly since the lunching of structural adjustment programme (SAP) in 1986 which not only provide foreign investors the opportunity to invest in various sectors of the economy but also ends the policy of restriction on the repatriation of profits and capital out of the country. However, with many years of increasing FDI inflows in the country, there are many unanswered questions on the benefits or impacts of foreign investors to Nigerian economy. One of those questions is whether FDI in one sector has spill-over effect to another sector over time. Following this, this study is stimulated by the need to answer this particular question by assessing the impact of oil and non-oil FDI on Nigeria economy. There are numerous past empirical studies that dealt with the impact of FDI on economic growth in Nigeria (Uma et al., 2015; Babalola et al., 2012; Olokoyo, 2012; Adegbite and Ayadi, 2010; Ayanwale, 2007), however, until quite recently, limited number of these studies assess FDI contributions to oil and non-oil sector in Nigeria. This call for an empirical study that would be used to find an evidence to support oil FDI and non-oil FDI growth hypothesis in Nigeria.

paper¹ adds two This distinctive contributions to the existing knowledge. First, this is one of the very first papers to investigate the link between oil and non-oil FDI and economic growth in Nigeria by including real domestic investment and real export of goods and services as determinants of rates of growth. Second, the paper examines oil and non-oil FDIgrowth relationship using autoregressive (ARDL) distributed lag bound-test approach. The study used ARDL boundtest framework in particular because it has a number of advantages compared to other conventional methods such as Engle and Granger's (1987) and Johansen (1988) methods. For instance, the first two conventional cointegration methods estimate long-run relationships in the context of system equations, whereas the ARDL method uses only a single reduced from equation (Pesaran et al., 2001). It has also additional advantage over other cointegration approach because order of integration of the series does not matter in applying the ARDL bound testing if no variable is found to be stationary.

The purpose of this paper is to assess the impact of disaggregated FDI on economic growth by using ARDL-bound testing approach to cointegration. The results of this analysis have important implications for the implementation of future policies to attract foreign capital investment in Nigeria. The rest of the paper is organised as follows. In the next section, we review empirical and theoretical issues, followed by methodology of the study, results and discussion and conclusion and recommendations.

2. Empirical Literature and Theoretical Framework

2.1 Empirical Literature

It is argued in the empirical literature that FDI is one of the driving forces for economic growth for both developed and developing countries. Although, the evidences are ambiguous with a wide range of contradictory empirical result, available evidence developed from countries seems to suggest there is a perfect positive correlation between economic growth and FDI (Apergis et al., 2008; Lipsey and Sjoholm, 2001; Liu et al., 2000). On the contrary, there are number of studies from developing countries that tried to measure the impact of FDI on economic growth but the results are not so clear, with some finding

¹ It is clear in the literature that, attempts to find a consistent relationship between the extent of FDI inflows and national economic growth do not produce strong and consistent relationships and that bulk of the FDI inflows into Nigeria were invested into the extractive industry if not of recent.

showing positive spillovers (Aurangzeb and Stengos, 2014; Kokko, 1994; Blomstrom, 1986) and others such as Aitken et. al. (1997) reporting limited evidence. Still others find no evidence of positive short-run spillover from foreign firms. The mixed result from some of these studies are attributed in most cases to forward and backward linkages that wasn't necessarily attained (Anand and Sen, 2000; et.al.1997) which Aitken suggest arguments of FDI encouraging increased productivity due to competition may not be true in practice (Aitken et al. 1999). Other reasons include the fact that transnational corporations (TNCs) tend to locate in high productivity industries and, therefore, could force less productive firms to exit (Smarzynska, 2002). Cobham (2001) also postulates the crowding out of domestic firms and possible contraction in total industry size and or employment.

The review shows that the debate on the impact of FDI on economic growth is far from being conclusive. The role of FDI seems to be country specific, and can be positive, negative or insignificant, depending on the economic, institutional and technological conditions in the recipient countries. Finally, from the literature reviewed it also suggest the relationship between FDI and growth is conditional on the macroeconomic

dispensation the country in question is passing through. In fact, Zhang (2001) asserts that "the extent to which FDI contributes to growth depends on the economic and social condition or in short, the quality of the environment of the recipient country". In essence, the impact FDI has on the growth of any economy may be country and period specific, and as such there is the need for country specific studies.

2.3 Theoretical Framework

That FDI is positively correlated with economic growth is situated in growth theory that emphasizes the role of improved technology, efficiency and productivity in promoting growth (Lim, 2001). The effect of FDI on economic growth can be analyzed in the standard growth accounting framework. To begin with, the capital stock is assumed to consist of two components: domestic and foreign owned capital stock. So,

$K_t = K_{dt} + K_{ft}$

We adopt an augmented Solow production function (Solow, 1956) that makes output a function of stocks of capital, labor, human capital and productivity with some few modifications to allow us include another variable into the model. Using a Cobb–Douglas production function we can show that:

$$Y_t = A_t K^{\alpha}_{\ dt} K^{\lambda}_{\ ft} E^{\beta}_{\ t} \tag{1}$$

Where *Y* is the flow of output, K_{dt} , K_{ft} represent the domestic and foreign owned capital stocks, respectively, *E* is the total export of goods and services, taking logs and differentiating Equation 1 with respect to time, we obtain the familiar growth equation:

$$y_t = a_t + \alpha k_{dt} + \lambda k_{ft} + \beta e_t \tag{2}$$

where lower case letters represent the growth rates of output, domestic capital stock, foreign capital stock, and export, and α , λ and β represent the elasticity of output, domestic capital stock, foreign capital stock, and export respectively. Theoretically, α , and β are expected to be positive while the sign of λ would depend on the relative strength of competition and linkage effects and other externalities that FDI generates in the development process as discussed in previous sections. Equation (2) above is therefore the basis for the empirical model estimation in the next section.

3 Econometric Methodology

3.1 Model Specification

The foregoing suggests that a general empirical model of disaggregated FDI on Nigeria's economic growth can be put as:

$$GDP = F$$
 (RINV, OFDI, NFDI, and REXP) (4)

Where:

GDP = Real gross domestic product.

RINV = Real domestic investment

OFDI = foreign direct investment to the oil sector

NFDI = Foreign direct investment to all sectors of the economy excluding oil sector

REXP = Real export of goods and services

Specifically, given the time series nature of the data, the postulated long-run model in logarithmic form is:

$$GDP_t = a + \beta_1 RINV_t + \beta_2 OFDI_t + \beta_3$$

$$NFDI_t + \beta_4 REXP_t + \varepsilon_t$$
(5)

Where: ε_i is the stochastic disturbance term. α and β_i , represent the intercept and the and coefficients respectively. The coefficients of regression, β_i (i = 1, 2,4) indicates how a unit change in any of the independent variables affects the dependent variable (the growth rate of gross domestic product). The error, ε_t , is incorporated in the equation to cater for other factors that may influence GDP which are not captured in the model. Where the values of β_1 , β_2 , β_3 and $\beta_4 > 0$ (there values are expected to be greater than zero).

3.2 Unit Root Test

The study employs ADF unit root test procedure. This is done in order to provide meaningful policy analysis with the results. As it is important to distinguish between correlation that arises from a share trend and one associated with an underlying causal relationship. To this end, our data were tested for unit root (nonstationarity) by using the Augmented Dickey-Fuller test (ADF) (Dickey and Fuller, 1979) both with constant and deterministic trend. The following equation present the possible form of the ADF test:

$$\Delta Y_t = \alpha_0 + \delta Y_{t-1} + \alpha_2 t + \sum Y_{t-k} + u_t \qquad (6)$$

Where ΔY_t is the change in the dependent variable, α_0 is a constant term, α_2 is a coefficient of a time trend t, ΔY_{t-k} is the set of lagged explanatory variables, u_t is by assumption a white noise error term and k is the lag length. The test involves testing the following hypothesis:

H0: $\delta = 0$ (Yt is not stationary or Yt has a unit root)

H1: $\delta > 0$ (Yt is stationary)

3.3 ARDL Approach to Cointegration

To investigate the long-run relationship among the variables under consideration, the bounds test for co-integration within ARDL (autoregressive distributed lag) modelling approach is adopted in the study. Pesaran et al. (2001) developed the model and can be applied regardless of the order of integration of the variables (irrespective of whether regressors are purely I (0), purely I (1) or mutually cointegrated. In simple form, the ARDL modelling approach involves estimating the following conditional error correction models:

 $\Delta \ln Y_{t} = \beta_{0} + \beta_{1} \ln Y_{t-1} + \beta_{2} \ln I_{t-1} + \beta_{3} \ln O_{t-1} + \beta_{4} \ln N_{t-1} + \beta_{5} \ln E_{t-1} + \sum \beta_{6} \Delta \ln Y_{t-1} + \sum \beta_{7} \Delta \ln I_{t-1} + \sum \beta_{8} \Delta \ln O_{t-1} + \sum \beta_{9} \Delta \ln N_{t-1} + \sum \beta_{10} \Delta \ln N_{t-1} + U_{t}$ (7)

The structural lag of the model is determined using the Schwarz Bayesian Criterion.

If co-integration is found based on the bound test, the error correction model (ECM) can be estimated. The ECM is a reparametrisation of the ARDL (Asteriou and Hall, 2007). The error correction models of co-integration can therefore be specified as follows:

$$\Delta Y_{t} = \alpha_{0} + \alpha_{2}t + \sum \Delta Y_{t-k} + \sum \Delta X_{t-k} + \pi e_{t-1} + e_{t}$$
(8)

Where; Δ denotes the difference operator, e_t is serially independent random error with zero mean, and π is the error correction term (also known as the adjustment coefficient) derived from the long-run co-integration model. In fact, π tells us how much of the equilibrium error is corrected each period and it is expected to be negative and statistically significant. If $\pi=0$, then there is no adjustment and therefore there is no long run relationship.

4. Results and Discussion

4.1 Stationarity Test

Table 1: ADF Unit Root Test						
Variables	ADF	at Level	Variables ADF at First Difference			
	t-Statistic	Probabili ty		t-Statistic	Probabili ty	
RGDP	-1.561081	0.7866	ΔRGDP	-6.56312	0.0000*	
RINV	-1.168056	0.9008	ΔRINV	-10.2266	0.0000*	
OFDI	-1.985931	0.5859	ΔOFDI	-6.28669	0.0001*	
NFDI	0.189202	0.9674	ΔNFDI	-9.65722	0.0000*	
REXP	-4.250975	0.0103**	ΔREXP	-6.83267	0.0000*	

Source: Extraction from estimation output using E-views 7. Note: *and ** indicates rejection of hypothesis at 1% and 5% level of significance

Table 1 above reports the result of ADF unit root test. The test indicates that, all the variables are found to be stationary in their first difference at 1% level of significance except REXP which is stationary both at level and first difference. Thus, the test obviously revealed that the variables are a mixture of I (1) and I (0), none is I (2). This gives room for the ARDL approach to cointegration.

4.2. Bound Test Result

Having confirmed the absence of I (2) in our variables, the next important task is to check whether there exists a long run relationship among the variables. To achieve that, we estimate the equation using ordinary least squares (OLS) technique and then conduct a Wald test in Eviews 7 and conduct a wald test to confirm the existence of causality among the dependent and independent variables. The table below present the result the bound test based on ARDL approach test.

Table 2: F- stausue for testing the existence of Lung Run Cointegration					
Model		F- Statistic			
GDP = F (RINV, OFI	DI, NFDI, and REXP)	7.987***			
Critical Value (%)	Lower Bound I(0)	Upper Bound I (1)			
1%	4.768	6.67			
5%	3.354	4.774			
10%	2.752	3.994			

Table 2: F- statistic for testing the existence of Lung Run Cointegration

Notes: *, ** and *** denote significant at 10%, 5% and 1% levels, respectively. Critical values are obtained from Narayan (2005).

From the table above, we can see that the null hypothesis of no cointegration among our variables is rejected at 1% since the Fstatistic is greater than critical upper bound value at 1% significance level. As such we conclude that there is long run cointegration relationship among our variables. Hence we go further to estimate our model.

4.3 Long Run Estimates

Since the existence of long run cointegration relationship is confirmed in the model, we begin by presenting the long run estimates and then bring the short run estimates in the next section.

Regressor	Coefficient	Standard	T-Ratio	[Prob]
		Error		
RINV	0.31787	0.11305	2.8118	[.010]
OFDI	-0.046832	0.065784	-0.7119	[.484]
NFDI	0.07875	0.20621	0.3818	[.146]
REXP	0.021887	0.15589	0.1404	[.090]
С	7.6095	1.8133	4.1966	[.000]
Τ	0.068772	0.033912	2.028	[.055]

Table 3: Result of Long run estimates

Sources: Extracted from estimated output using Microfits

In Table 3, we present the long run coefficients. Based on the p values, RINV is statistically significant at 1%, while all other variables appear to be insignificant. But unlike the coefficient of OFDI, the coefficients of REXP, RINV and NFDI have the expected theoretical signs. The negative sign in OFDI suggests that

foreign investment in the oil sector exerts negative effect on the Nigeria's real GDP growth in the long run. A possible explanation as to why the coefficient of OFDI deviates from the theoretical underpinning is a possible impact of high profit repatriation and lack of linkages with the real sector of the economy.

4.4 Short Run ARDL Estimates

Table 4:	Result	of the	Short	run	estimates
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Autoregressive Distribute	d Lag Estimates	ARDL	(1,2,0,0)
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Dependent Variable RGDP					
Regressor	Coefficient	Standard Error	T-Ratio	[Prob]	
RGDP(-1)	0.64721	0.15524	4.169	[.000]	
RINV	0.15447	0.054145	2.8529	[.010]	

RINV(-1)	0.13593	0.06595	2.0612	[.052]
RINV(-2)	0.093605	0.050004	1.8719	[.075]
OFDI	-0.016522	0.024482	-1.7487	[.607]
NFDI	0.027782	0.069127	0.4019	[.092]
REXP	0.0077213	0.054095	0.14274	[.888]
С	2.6845	1.3089	2.051	[.043]
Τ	0.024262	0.012085	2.0076	[.038]
R-Squared	0.98677	R-Bar-Squared	0.98173	
Serial Correlati	on*CHSQ(1) = 2.	6261 [.105]		
Heteroscedastic	$\operatorname{ity*CHS}\overline{\mathbf{Q}}(1) = 0.$	12836 [.720]		

Sources: Extracted from estimated output using Microfits

The result of the ARDL estimates above present the short run estimates of the variables. The result shows that the coefficient lagged RGDP and RINV are significant at 1 percent level, that of NFDI, constant term and time trend are all significant at 5% level. In terms of theoretical expected signs, all the coefficients conform with theoretical underpinnings except OFDI that have

negative sign which may be due to the high rate of profit repatriation and poor linkage with the real sector of the economy. Although two of the coefficients are insignificant in the model, the regression result fits reasonably looking at the R squared adjusted (0.98173) and the passes the diagnostic tests of non-existence of autocorrelation and heteroskedasticity (see Table 4).

4.5 Estimates for Error Correction Model

Table 5 Result of Error Correction Model

Dependent Va	riable RGDP			
Regressor	Coefficient	Standard Error	T-Ratio	[Prob]
dRINV	0.15447	0.054145	2.8529	[.009]
dRINV1	-0.093605	0.050004	-1.8719	[.075]
dOFDI	-0.016522	0.024482	-0.6749	[.507]
dNFDI	0.027782	0.069127	0.4019	[.092]
dREXP	0.0077213	0.054095	0.14274	[.088]
dC	2.6845	1.3089	2.051	[.052]
dT	0.024262	0.012085	2.0076	[.057]
ecm(-1)	-0.35279	0.15524	-2.2725	[.033]
R-Squared	.59470	R-Bar-Squared	0.4403	

Error Correction Representation for the Selected Estimates ARDL Model

Sources: Extracted from estimated output using Microfits

The error correction regression result in the table above, shows that, the error correction coefficient is estimated to be -0.35279 with probability of 0.033, is statistically significant. This means that 35.28 per cent of the adjustment takes place every year. This implies that, full adjustment occurs -100% (1/30.28) x 100 = 3.3 years. That is to say any short-run deviation will take about 3.3 years to adjust to long-run equilibrium.

Figure 1: Plots of Cumulative Sum of Squares of Recursive Residuals



The figure above shows that the CUSUM of square plots are within the bound at 5% level of significance. The straight lines represent critical bounds at 5 per cent significance level. The figures further confirm the stability of the model as the entire CUSUM test lines fall within the straight lines.

5 Conclusion

By and large, our result based on the shortrun estimations and their discussions revealed that foreign direct investment in the non-oil sectors contribute to economic growth and that domestic investment and complementary export are also to economic growth in Nigeria over the period of study. In fact, economic growth has been driven by increase in the level of domestic investment, growth of exports and foreign direct investment as expected. is positive relationship Thus, there between Non-oil FDI and GDP although the overall effect of Non-oil FDI may not be very significant as expected due to the poor macroeconomic conditions and poor institutional frameworks that will allow the benefits of FDI to be maximized

Based on our findings, the paper suggests that Government should provide appropriate environment to attract more FDI inflows (particularly manufacturing FDI which has greater effect on growth). Such measures as relaxation or elimination of restrictions on profits and capital remittances, opening of formerly "priority" sectors to investors and provision of adequate security among others should be put in place.

Efforts should also be made to ensure that the positive "spillover" effects associated with FDI offset the short term costs associated with the implementation of these incentives. Once the reverse flows of profits and capital are deducted from the gross inflows of FDI into the country, the contribution of FDI to the financing of private capital formulation may be highly jeopardized.

The oil sector should be integrated into the economy. A major policy in this direction is the liberalization of the sector. This will lead to increased private participation, higher employment generation with possible multiplier effects on the economy as a whole.

The result equally suggests the need to increase export for greater growth performance. This can be achieved through policies that aimed at ensuring greater private (domestic and foreign) participation in the economy that will eventually leads to increase in exports.

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