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Capital Inflow and Industrial Performance in Nigeria: Including the Excluded[1]

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Abstract

Africa most populous black nations remain underdeveloped, mainly due to shambolic industrial sector performance. Rising problems of insecurity, corrupt practices, consumerism structure have made gains from capital inflows minimal. Little empirical credence has been leaned to the capital inflow-industrial output growth relationship in Nigeria. This anomaly has resulted in shortsighted policy formulation and attendant consequences.This paper examined international capital flows and industrial performance in Nigeria. The paper employed the two-step Engle and Granger estimation procedure and the Granger Causality to estimate parameters of the indices of industrial output growth and capital inflows to Nigeria. Findings revealed that labour participation, gross fixed capital formation, foreign direct investment (FDI) and portfolio investment have a significant positive relationship with industrial performance in Nigeria. Findings also revealed unidirectional causality from labour participation, gross fixed capital formation, foreign direct investment (FDI) and portfolio investmentto industrial performance in Nigeria. Based on the findings, the Nigerian government should create an enabling environment to attract more capital inflow that could augment domestic resources with the sole aim of growing the industrial sector.

Keywords: Capital Inflow, Industrial Performance, Error Correction Modelling, Granger Causality, Nigeria.

JEL Codes: C22, F21, P47

1.0 Introduction

African leaders and their development partners around the world are continuously engaged in ensuring poverty is sabotaged in and around the continent. Several measures of poverty eradication have been adopted with minimal impact (Carter & May 1999). With the Africa 2063 Agenda in focus, industrial growth and development remain the most pervasive option for Africa to gain momentum for structural transformation. Theoretical and empirical findings (see Aryeetey & Moyo, 2012; Bräutigam & Xiaoyang, 2011; Morris & Fessehaie, 2014; Okereke et al., 2019; Taylor, 2016 for some examples) leaned credence to the revolutionary industrial growth in African economies and confirm that more strategic industries will not only help African countries to amass affluence but also help solve the age-old problems of redundancy that have redefined their teeming populations. Industrial growth offers viable paths for skill and technology advancement (Aryeetey & Moyo, 2012), wealth creation (Morris & Fessehaie, 2014), youth engagement (Okereke *et al.*, 2019), economic divergence (Oyelaran-Oyeyinka, 2014) and many more. Thus, it is adjudged to be the most relevant for many African countries, particularly Nigeria (World Bank, 2014). The ability of a well-equipped industrial sector to absorb unskilled and semi-skilled workforce is second to no other sector in an economy (Daveri & Tabellini, 2000). Industrialised Africa will be famous not for the commodities-based economic approach but rather because of its potentials for higher value-addition and its ability to protect the economy from the shocks in global commodity markets (Morris & Fessehaie, 2014). African countries such as Ethiopia, Kenya, Nigeria and South Africa, have begun to intensify efforts to leverage their comparative advantages through specific industrial development programmes to break the established global manufacturing value chains, in many commodities such as textiles, metal processing, leather, agro-processing primary (World Bank, 2013). Even the industrialised nations (the G7-Canada, Germany, France, Italy, Japan, UK and the US) operating service-based economies are recently looking for an inventive approach to re-shore their manufacturing (a core of industrialisation) to seizure deteriorating growth and employment prospects that are in the time past absent (Mahipal & Prasad, 2004). In clear terms, the importance of industrial output growth can never be overstated, not least when it comes to the context of development in Nigeria.

With so much attention going into industrial output growth these days, the questions are many and unanswered.How relevant is capital inflows to Nigeria as a determinant of industrial output growth objectives? What is the nature and volume of capital inflow? How much of it goes to the industrial sector? and how well do they predict variations in industrial output growth in Nigeria? These are quite essential questions seeing how the industrial sector has alwaysbeen a significant contributor to growth outcomes. With increasingly more countries allowing for cross-border capital mobility, the impact of capital inflows on industrial output has become a matter of considerable policy relevance. Theoretically, capital inflows can increase access to finance of industries and,thereby, promote industrial investment growth, expenditure smoothing, and international risk sharing that boost investors' confidence. Knowing how capital flows induce changes in industrial output growth in Nigeria remain grossly understudied in the extant literature of public finance. Apparently, no country-specific study has examined capital flows for industrial output growth in Nigeria. Given the growing sophistication of capital flow to Nigeria because of rising problems of insecurity and terrorism, weak institutional frameworks, arbitrage motives of hedging, exchange rate fluctuations, more recent research have focused on identifying types of capital flow that enhance economic growth. Little attention has been paid to the role of capital flow-industrial output growth relationship in Nigeria.

Another essential issue that has generated debate is the role of capital inflow to jump-start the growth of the industrial sector. A growing list of studies found a positive relationship between financial openness, capital mobility and economic growth (see De Gregorio & Guidotti, 1995; Levine, 1997; Rajan & Zingales, 1998 for examples). However,Gourinchas and Jeanne (2006) found that welfare gains accruing to the industrial sector when finances are sourced across borders to augment domestic savings are negligible relative to the welfare gain of take-off when industrial growth in domestic sponsored. The arguments are hinged on the fact that capital inflow to African countries are motivated by the act of capitalism from the sending countries (arguments are advanced for inflows from Europe and North America). A capitalist motivated capital flows leaves damaging effect in recipient countries in the event of withdrawal of capital, leading to capital flight (Efobi & Asongu, 2016). Thus, leaving an enormous investment gap that creates further economic problems. However, non-capitalist motivated capital flows are growth and development inclined and thus sustainable (arguments are advanced for inflows from China and other Asian countries). Since the onset of the evaluation of gains from capital flows, the structural relationship with industrial development remains dimly discerned in Nigeria mainly as it concerns the primary effect of these capital flows for structural transformation which largely hinge on moving from agrarian to industrialised economy. It is not even entirely clear how capital flow predicts variations in the industrial sector of Nigeria. A growing list of studies (see Akinlo, 2004; Buera & Shin, 2017; Osinubi & Amaghionyeodiwe, 2010) has focused on the capital flow-economic growth nexus neglecting the underlying structural dynamics of capital flow as a predictor of industrial output growth in Nigeria.

The industrial development pattern of developing countries has remained sticky even when additional foreign investment from abroad is injected (Markusen, 1996). Despite the conventional relationship between foreign direct investment flows and growth outcomes moving symmetrically, no evidence providing additional financing over domestic savings ultimately leads to industrialisation (Brandl & Traxler, 2010). It is clear that inflow of funs spur industrial growth but remains unclear is the magnitude of change in industrial output as a result of the rate of change in capital inflow. Prasad, Rajan, and Subramanian (2007) in contrast to standard theoretical economic growth models argued that developing countries with low-level industrialisation that have relied more on foreign finance had not grown faster in the long run. Similarly, Aizenman, Pinto, and Radziwill (2007) argued that the economic growth of developing and emerging markets were relatively self-financed when comparing the value of domestic capital against the foreign inflow of funds.

This study attempts to lean empirical credence to the capital inflow-industrial output growth relationship in Nigeria to inform policy direction and research. We adopt a country-specific analytical approach to examine the predictive capacity of capital inflow for industrial output growth in Nigeria. We quantify the relationship intheir evolution over time by rolling the regressions forward over 31 years. Finally, we evaluate the impact of critical variables focusing on Nigeria, which is an economyrepresentative of the African periphery. We conducted the Granger Causality test to evaluate the direction of causality between the variables of interest. We justified that our model does not violate any of the assumptions of the classical linear regression model by conducting the various post estimation procedure that confirms the reliability of estimates emanating from this study. The subsequent sections are the literature review, the methodology used, then the empirical results and their corresponding interpretations and discussion while the last part gives the conclusion and policy recommendations.

2.0 Literature Review

Capital inflow and industrial output growth have been discussed along various dimensions and geographical landscapes. Oseni, Adekunle and Alabi (2019) found volatility in the exchange rate to predict significant variations in industrial output growth in Nigeria .In related findings, Jongbo (2014) advanced arguments for the fluctuating exchange rate as a predictor of industrial sector performance. The author relied on the ordinary least square and found that real exchange rate significantly induces variations in industrial sector performance in Nigeria. With the attendant heterogeneous influence of exchange rate fluctuations which could appreciate or depreciate, industrial sector performance bows to pressures of exchange rate fluctuations. Furthermore, Adeniyi, Oyinlola and Omisakin (2011) established a linear and positive influence of exchange rate on the industrial sector in Nigeria. In other findings, Okafor, Adegbite and Abiola (2018) found exchange rate and inflation shocks to hurt the growth of the industrial sector in Nigeria. It is obvious from the review of literature that the contemporaneous influence that capital inflows play in the industrial sector development of Nigeria remains gross understudied.

In other country studies that are not completely on the exact structural relationship between capital inflow and industrial performance in Nigeria, Ojedide (2005) studied capital flows volatility and macroeconomic performance in Nigeria and found that capital flows are a function of the initial stage of the developing country. Consequent on the above, we test the hypothesis that capital inflows would propel the growthin the industrial sector of Nigeria assuming initial conditions are met. In a trivariate country analysis, Herzer (2006) relied on the bivariate Vector Autoregressive (VAR) estimation procedure to study FDI-growth causal relationship in Nigeria, Srilanka, Tunisia and Egypt. Findings revealed that FDI catalyses the productivity of the manufacturing sector, which in turn speeds up the growth rate of Gross Domestic Product of the countries. Using the *two-step* Engle and Granger estimation procedure, Steve, Samuel and Bodiseowei (2013) found domestic debt to positive influence foreign aid while debt inversely predicts economic growth. In their analysis of capital outsourcing and growth of manufacturing sector, Johnson, Fredrick and Romanus (2017), found FDI to significant predict variations in economic growth

In other climes and across borders, Mensah, Awunyo-Vitor, andAsare-Menako (2013) argued that volatility in exchange rate determines Ghana’s manufacturing sector employment growth. Based on the empirical credence, we opine that the devaluation of the Ghanian Cedis relative to the U.S. Dollarscould be responsible for the inefficient industrial sector in Ghana. Nonetheless,UNECA (2009) found that religious tension,productive and non-productive risks, percentage of oil in total exports, current market size, the volume of FDI inflow, pervasive corruption, saving ration, nominal credit to the private sector are critical determinants of FDI inflows in Africa. Ojo and Alege (2010) corroborate the findings of UNECA in their empirical analysis of the impact of global financial crisis and policy implications on the sudden rise on FDI inflows in twenty-seven (27) economies in Sub Saharan Africa. The authors found that output growth co-moves with the inflows of FDI in Africa.In other related studies, Chakarabarti (2001) found that market factors are the principal determinant of FDI inflows to Africa.FDI inflows are sensitive to real exchange rate movements in Sub-Saharan Africa Besides (Ogun, Egwaikkhide & Ogunleye, 2012).

We conclude that little has been done on the empirical validation of capital inflow-industrial output growth relationship in Nigeria. Evidence on the industrial sector performance in Nigeria has been studied against the volatility or fluctuations in the exchange rate. How remittances inflows, foreign direct investment, portfolio investment and official development assistance in the form of aid predicts variation in Nigeria industrial development remains dimly discerned. The intricacies of such omission in the literature of industrial sector development in Nigeria underpin this study. Consequent on the above, we test the hypothesis that

H_0: Capital Inflow has no significant relationship with industrial output growth in Nigeria

H_1: Capital Inflow has a significant relationship with industrial output growth in Nigeria

3.0 Methodology

In accounting for industrial performance as induced by capital inflowin Nigeria, the study follows the dual gap theory. Developing countries like Nigeria rely on the inflow of funds to augments the savings-investment gap. The equilibrating condition of the dual-gap model occurs at:

$$S_t = I_t \qquad \textbf{(1)}$$

With S_t representing the national savings level and I_t been the predominant investment level. Nigeria has been predominantly characterized by the low level of domestic savings amidstlofty investment objectives; we obtained the savings investment-gap, which creates a vacuum for external capital inflow to augment domestic savings to meet the lofty investment objectives. The functional relationship of such relationship is expressed as:

$$S_t + CAP_{FLOW_t} = I_t \qquad \textbf{(2)}$$

Unvaryingly, we re-evaluate our capital stock function to include all forms of capital inflows:

$$K_t = S_t + CAP_{FLOW_t} + (1 - \delta)K_{t-1} = I_t \qquad \textbf{(3)}$$

where K_t defines the capital stock parameter,$S_t$is the national savings level, $CAP_{FLOW_t}$are the capital inflow options to the country,δ measures depreciation of capital and I_t is the predominant investment level.

We proceed to estimate the industrial performance model in aCobb-Douglas production function.

$$Y_t = AL_t^{1-\propto}K_t^{\propto}CAP_{FLOW_t} \qquad \textbf{(4)}$$

$Y_t$represent the output growth of the industry;$L_t$measuresoutput per unit of effective labour; $K_t$represents output per unit of effective capital andCAP_{FLOW_t} is the capital inflows to the country. The capital inflow-industrial output growth induced model is expressed as:

$$IND_{OUT_t} = A + \sum_{i}^{n=1} \gamma_n AL_t + \sum_{i}^{n=1} \pi_n K_t + \sum_{i}^{n=1} \omega_n CAP_{FLOW_t} + \mu_t$$

(5)

where γ, π, andω, are the elasticities of human capital (L), physical capital (K), and capital flows respectively. $IND_{OUT_t}$is industrial output growth in Nigeria, A is the efficiency of the productive economy, AL is labour force or the working population, $k_t$is domestic capital stock,$CAP_{FLOW_t}$is a capital inflow to Nigeria, *t* is the time series characteristics of the data set (1987-2017). Given the purpose of this study which is to examine the effect of capital flow on industrial output growth, we take the semi-logarithms and time derivatives of equation **(5)** to generate the following dynamic function:

$$lnIND_{OUT_t} = A + \sum_{i}^{n=1} \gamma_n AL_t + \sum_{i}^{n=1} \pi_n lnK_t + \sum_{i}^{n=1} \omega_n lnCAP_{FLOW_t} + \mu_t \tag{6}$$

Explicitly the explanatory model intended to capture the dynamics of industrial output growth was expressed in equation **(7)**

$$lnIND_{OUT_t} = A + \sum_{i}^{n=1} \gamma_n AL_t + \sum_{i}^{n=1} \pi_n lnK_t + \sum_{i}^{n=1} \omega_n lnFDI_t + \sum_{i}^{n=1} \emptyset_n lnREM_t + \sum_{i}^{n=1} \infty_n lnODA_t + \sum_{i}^{n=1} \partial_n lnPORT_{INV_t} + \mu_t \tag{7}$$

where γ, π, ω, $\emptyset$, ∞, and ∂, are the elasticities of human capital (L), physical capital (K), FDI, remittances, official development assistance, portfolio investment, respectively. $IND_{OUT_t}$is industrial output growth in Nigeria, A is the efficiency of the productive economy, AL is labour force or the working population, $k_t$is domestic capital stock, FDI is the foreign direct investment to Nigeria, $REM$is remittances inflow to Nigeria, ODA is official development assistance to Nigeria, $PORT_{INV}$ is portfolio investment to Nigeria, *t*defines the time parameter of the model.

Data Sources and Measurements

Our study used annual time series data for indices of capital flows and industrial output growth from 1987 through 2017. The choice of Nigeria was guided by the desire to explain the structural transformation of the Nigerian industrial sector with the attendant consequences of capital inflows. This study is also guided by the availability of reliable data on aggregates of capital inflows and associative consequences. Capital inflows were measured using foreign direct investment, official development assistance, portfolio investment and remittances as used in the work of Edwards (1990); Calvo (1998); Reisen and Soto (2001); Schneider (2003); De Vita and Kyaw (2008); Opperman and Adjasi (2017). However, industrial output growth was measured using industry value added as in Bandyopadhyay, Sandler, and Younas (2014); Bezić, Galović, and Mišević (2016); Filer and Stanišić (2016); Galović, Bezić, and Mišević (2018). We rely on data from the World Bank Database (World Bank, 2017). The variables used in this study are described in Table 1.

Table 1: Variable Description

Abbreviation	Variable	Measured As	Source
IND_{OUT_t}	Industrial Output Growth in Nigeria	Industry Value Added	World Development Indicator (WDI), 2017
AL_{it}	Labor	Labor Participation Rate	World Development Indicator (WDI), 2017
K_{it}	Capital Stock	Gross Fixed Capital Formation	World Development Indicator (WDI), 2017
FDI	Foreign Direct Investment	Net Foreign Direct Investment Inflows	World Development Indicator (WDI), 2017
REM	Remittance	Remittances Inflows	World Development Indicator (WDI), 2017
ODA	Official Development Assistance	Official Development Assistance to developing nations	World Development Indicator (WDI), 2017
$PORT_{INV}$	Portfolio Investment	Portfolio Investment	World Development Indicator (WDI), 2017

Source: Authors, 2020

Estimation Technique

We presented the pre-estimation analysis from the descriptive statisticsand the unit root test. The descriptive analysis confirmed the normality condition of the data sets. The unit root establishes the order of integration of the variables and subsequently informs the estimation strategy to be adopted. We proceed to estimate the cointegration test to confirm the existence of long-run covariance among the variables (Johansen & Juselius, 1990; Pesaran & Shin, 2012; Wang & Wu, 2012). The Trace Statistics and Maximum Eigenvalue can be estimated from the Eigenvalues of the coefficient matrix. We proceed to estimate the *two-step* Engle and Granger estimation procedure to adjust long run-convergence behaviour to suit gradual short-run equilibrium(Engle & Granger, 2015). Also, we estimated the Granger causality test to determine the lag-order in the causation model(Eichler, 2007).

4.0 Results and Discussion

The descriptive statistics of the data provides vitalinformation about the sample series such as the mean, median, minimum and maximum values; and the distribution of the sample measured by the skewness, kurtosis and Jaque-Bera statistics.

Table 2: Descriptive Statistics

Descriptive Statistics	IND_{OUT_t}	L_t	K_t	FDI_t	REM_t	ODA_t	$PORT_{INV_t}$
Mean	7.5001	3.3613	2.6501	4.7086	3.3613	2.6502	4.7086
Median	7.4401	3.0121	2.9101	3.9492	3.0121	2.9101	3.9492
Maximum	9.1101	8.8325	3.9901	5.4258	4.8326	3.5421	5.4258
Minimum	5.2301	0.6426	1.6209	2.2513	1.6426	1.6439	2.2232
Std. Dev.	2.0001	2.2081	8.3209	3.5653	2.2081	2.4303	1.3368
Skewness	1.3093	1.8801	1.5863	1.9769	1.8801	2.5863	2.9769
Kurtosis	1.6697	2.9775	2.1772	1.0603	2.9772	2.1707	2.2357
Jargue-Bera	2.3312	2.4533	2.2349	4.1402	3.4221	2.2342	1.1046
Probability	0.3016	0.5562	0.2305	0.1183	0.4302	0.3271	0.5126
Observation	31	31	31	31	31	31	31

Source: Authors, 2020

The summary statistics result in Table 2 reveals a high tendency for normal distribution (mean and median values lie within the maximum and minimum values). We found positively skewed series and platykurtic distributions with flat tail relative to the normal distribution (values less than three (3)). We found the series to be normally distributed consequent upon probability values that are non-significant at 5% level of significance.

Unit Root Test

Table 3 ***Unit Root Test: Augmented Dickey-Fuller Test (ADF)***

Variables	*LevelT-Stat*	*Critical Value @ 5%*	*FirstDifferenceT-Stat*	*Critical Value @ 5%*	*Order of Integration*
IND_{OUT_t}	-0.5773	-3.3737	-4.3332	-1.4334	I (1)
AL_{it}	-1.3323	-2.4333	-3.4331	-2.5888	I (1)
K_{it}	0.7447	-1.5531	-3.2332	-1.6632	I (1)
FDI	3.5523	-1.8203	-4.6682	-3.5626	I (1)
REM	-2.3682	-5.5236	-3.6362	-1.3322	I (1)
ODA	1.1221	1.0032	-2.3222	-1.3222	I (1)
$PORT_{INV}$	-1.3772`	-2.9511	-2.6631	-1.57231	I (1)

Source: Authors, 2020
Note: The summary statistics were computed before taking the natural logs

We found first differenced stationarity order across all series in the data set. We proceed to estimate the *two-step* Engle and Granger error correction estimation procedure to gradually adjust from the long run converging characteristics of the variables to the short-run equilibrating position. The error correction model thwarts long-run convergence in the parameterisation of the variables for short-run gradual equilibrium(Engle & Granger, 2015). The error correction model to be estimated is specified as

$$lnIND_{OUT_t} = A + \sum_{i}^{n=1} \gamma_n AL_t + \sum_{i}^{n=1} \pi_n lnK_t + \sum_{i}^{n=1} \omega_n lnFDI_t + \sum_{i}^{n=1} \emptyset_n lnREM_t + \sum_{i}^{n=1} \infty_n lnODA_t + \sum_{i}^{n=1} \partial_n lnPORT_{INV_t} + \aleph ECM_{(-1)} + \mu_t$$

All other variables remained as earlier defined except $ECM_{(-1)}$which is the error correction component of the model that gradually adjust frontal long-run convergence to short-run equilibrating conditions and $\aleph$ is the coefficient of the error correction component that gives the speed of adjustment back to short term equilibrium.

Optimal Lag Length Selection

Error correction modelling procedure is sensitive to lag length because of the time-varying parameters of the model adjustment. We rely on the Akaike Information Criteria to choose the optimal lag length for our industrial performance model. The information criteria with the lowest statistics in the corresponding lag-order selection give the optimal.

Table 4: Optimal Lag Length Selection

Lag length	AIC
0	4.7838
1	2.5622*

Source: Authors, 2020
Notes * indicates lag order selected by the criterion

Lag length one (1) is optimal based on result presented in Table 4. We proceed to established cointegrating level and short-run elasticities.

Cointegration Test

We drew inferences at 5% in the Tace and Maximum Eigen Values Statistics.

Table 5: Result of Johansen Co-integration test based on Trace Statistic and Max Eigenvalue

	Trace Statistic				Max. Eigen Value		
No. of CE(s)	**Eigenv alue**	**Trace Statistic**	**0,05 Critical Value**	**Prob.**	**Max-Eigen Value**	**Critical Value**	**Prob.**
None *	0.74	138.42	95.75	0.00*	44.52	40.10	0.01*
At most 1 *	0.69	93.91	69.82	0.00*	38.61	33.88	0.01*
At most 2*	0.53	55.29	47.86	0.01*	25.50	27.58	0.04*
At most 3*	0.42	29.80	29.80	0.05*	18.17	21.13	0.03*
At most 4	0.21	11.63	15.50	0.18	7.86	14.26	0.03*

Source: Authors, 2020
Notes: Trace test indicates 4 cointegrating eqn(s) at the 5% level; Max-eigenvalue test indicates 5 cointegration at the 5% level; * rejection of the hypothesis at the 5% level; **MacKinnon-Haug-Michelis (1999) p-values

We confirmed the existence of a long-run relationship since we rejected the null of no cointegration. We proceed to estimate the two-step Engle and Granger estimation procedure.

Table 6: Two-Step Engle and Granger Error Correction Result

DEP.VAR.: IND_{OUT_t}			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
A	0.1440	2.7373	0.0001**
AL_{it}	0.1193	2.6363	0.0234*
K_{it}	0.8734	2.8562	0.0421*
FDI	0.5662	3.6372	0.0432*
REM	0.1916	2.7237	0.1255
ODA	-0.4591	-1.0983	0.3014
$PORT_{INV}$	0.6895	2.7281	0.0167*
$ECM(-1)$	-0.5672	-2.9273	0.0014*
R-squared		0.7162	
Adjusted R^2		0.5129	
F-statistic		45.2321	
Prob(F-statistic)		0.0000**	
Durbin-Watson stat		2.0544	

Source: Authors, 2020
**(1%) *(5%) indicates significance levels

Table 6 presents the result of the *two-step* Engle and Granger error correction procedure. The estimated coefficient of the error correction vector is 0.4591, implying that the error correction term gradually adjusts back to the short-run equilibrating position at the rate of 56.72 per cent. The coefficient of the error correction term is appropriately signed and significant at 1% level of significance. The coefficient of error correction implies that about 57% of the previous year's disequilibrium in the economy’s industrial sector is revolved around its short run equilibrating position.Short-run estimates revealed that all the explanatory variable except official development assistance and portfolio investment induces a linear and positive relationship with industrial output growth in Nigeria. Explicitly, a percentage increase in the labour participation rate will result in 11.93 percentage increase in Industrial Output in Nigeria. Daveri and Tabellini (2000) found similar results for several industrialised economies. Nevertheless, a percentage increase in capital formation will result in 87.34 percentage increase in Industrial Output in Nigeria. This finding aligns with the work of Oded (2011) and Oketch (2006). Furthermore, a percentage increase in foreign direct investment will result in 56.62 percentage increase in Industrial Output in Nigeria as also revealed by Onanuga, Odusanaya and Adekunle (2020). Finally, a percentage increase in portfolio investment will result in 68.95 percentage increase in Industrial Output in Nigeria also corroborating the findings of Onanuga, Odusanaya and Adekunle (2020).However, remittances and official development assistance were found not to statistically determine industrial output growth in Nigeria at any level of significance. This implies that they do not predict variations in industrial output growth in Nigeria.

The value of the adjusted R^2 of 0.5129 indicates that explanatory variables of the model explain 51.29% of variations in industrial output growth in Nigeria, while the remaining 48.71% are captured outside the model. The Durbin Watson value of 2.0544 implies that the model is free from problems of serial correlation because it falls within the acceptance range of 1.5 to 2.5. The F-statistics of 45.2321 is statistically significant at the 1 per cent level, indicating that the explanatory variables are jointly significant, suggesting that the model exhibits the desired goodness of fit.

Granger Causality Test

In gauging the causation lag order of the capital inflow-industrial output relationship, we regressed the dependent variable " IND_{OUT_t}" on its own one period lag and the one-period lag of the regressors.We tested the null hypothesis of joint zero coefficients in the lagged regressors. By inference, failure to reject the null is equivalent to failure to reject the hypothesis that one-period lag of the regressors do not Granger cause industrial output in Nigeria.We expressed the causality model as:

$$IND_{OUT_t} = \propto_o + \sum_{j=1}^{p_2} \beta_j AL_{t-j} + \sum_{k=1}^{p_3} \beta_k lnK_{t-k} + \sum_{v=1}^{p_4} \beta_l FDI_{t-v} + \sum_{m=1}^{p_5} \beta_m REM_{t-m} + \sum_{w=1}^{p_5} \beta_w ODA_{t-w} + \sum_{z=1}^{p_5} \beta_z PORT_{INV_{t-z}} + \mu_t \quad \textbf{(8)}$$

To test the non-Granger causality from AL_t, K_t, FDI_t, REM_t, ODA_t and $PORT_{INV_t}$ to IND_{OUT_t}, we test the nullity of all coefficients, $\beta_j, \beta_{k,} \beta_v, \beta_m, \beta_w$ and β_z

The pairwise Granger Causality test results are given in Table 7.

Table 7: Granger Causality Result

Null hypothesis: X does not Granger Cause Y	**F-Statistics**	**Probability**
$IND_{OUT_t} \rightarrow AL_t$	1.6343	0.7723
$AL_t \rightarrow IND_{OUT_t}$	0.5432	0.0043**
$IND_{OUT_t} \rightarrow K_t$	2.5362	0.4170
$K_t \rightarrow IND_{OUT_t}$	0.4378	0.0052**
$IND_{OUT_t} \rightarrow FDI_t$	1.4526	0.1238
$FDI_t \rightarrow IND_{OUT_t}$	4.5623	0.0004**
$IND_{OUT_t} \rightarrow REM_t$	0.6272	0.6621
$REM_t \rightarrow IND_{OUT_t}$	1.3838	0.7372
$IND_{OUT_t} \rightarrow ODA_t$	2.9213	0.5366
$ODA_t \rightarrow IND_{OUT_t}$	2.6782	0.3521
$IND_{OUT_t} \rightarrow PORT_{INV_t}$	0.6342	0.9882
$PORT_{INV_t} \rightarrow IND_{OUT_t}$	2.8821	0.0234*

Source: Authors, 2020
**(1%) *(5%) indicates significance levels

The result in Table 7 indicated that there is unidirectional causality from labour participation, gross fixed capital formation (a measure of capital), FDI and portfolio investment to industrial output growth in Nigeria. Hence, labour participation, gross fixed capital formation, FDI and portfolio investmentgranger causes industrial output growth in Nigeria. The findings of this study agree with the findings of Singh (2012).

Table 8: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.5262	Prob. F (7,24)	0.2312
Obs*R-squared	2.6263	Prob. Chi-Square (7)	0.4552

Source: Authors, 2020

Given the probability value of 45.52 per cent, we fail to reject the null hypothesis and conclude that our short-run model is free from problems of serial correlation.

Table 9: Heteroscedasticity Test Result

Breusch-Pagan-Godfrey Heteroscedasticity Test:			
F-statistic	0.565126	Prob. F (7,24)	0.5357
Obs*R-squared	10.75370	Prob. Chi-Square (7)	0.9273

Source: Authors, 2020

Given the probability value of 92.73 per cent, we fail to reject the null hypothesis and conclude that our short-run model is free from problems of heteroskedasticity.

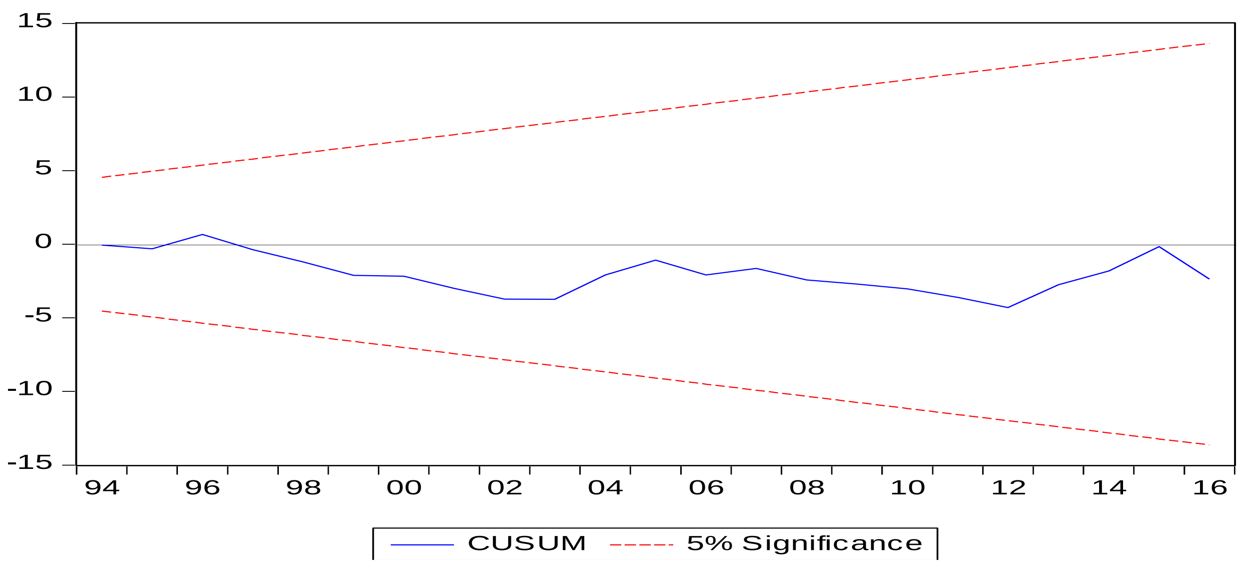

Fig. 1: CUSUM Stability Test

Source: Authors, 2020

The above figure shows that the CUSUM line is within the critical bounds of 5 per cent level of significance, which indicates that the model has structural stability.

5.0 Conclusion and Recommendations

Despite the significance of capital outsourcing as an alternative source of investment financing, the empirical connections between capital inflows and industrial output growth in Nigeria remain grossly understudied. Previous studies on the industrial development discourse in Nigeria have focused on the influence of exchange rate volatility or fluctuations in the industrial sector development literature in Nigeria. Little was done to establish the contemporaneous influence of the various sources of capital inflows on industrial sector growth. Which of these channels of capital inflows is more pervasive and efficient is an important research question for policy information research redefinition in Nigeria. This study relied on aggregate indices of capital inflows (remittances inflows, official development assistance (ODA), FDI inflows and portfolio investment) and industrial sector development from 1987 through 2017 to lean empirical credence to the relationship. We found that an increased labour participation rate is essential for the increase in industrial output in Nigeria just as Daveri and Tabellini (2000) have stressed in their findings. Domestic and international capital inflows jointly aid narrowing wide investment gap in Nigeria in consonance with Oded (2011); Oketch (2006) and Onanuga, Odusanaya and Adekunle (2020). However, remittances and official development are anathemas to industrial output growth in Nigeria, mainly owing to the unproductive role remittances plays in the African space. Remittances are mainly used for consumption which in pure form does not generate a return in itself. Development assistance is usually mismanaged owing mainly to the political motives that are associated. Labour participation, gross fixed capital formation, FDI and portfolio investment granger cause industrial output growth in Nigeria. Thus, corroborating the findings of Singh (2012). This study’s novelty is in twofold. Firstly, it leads the debate on capital inflows and industrial sector development in Nigeria. Secondly, this study relied on the *two-step* Engle and Granger estimation procedure to establish a baseline asymptotic relationship between capital inflow and industrial sector performance in Nigeria.

Based on the findings, this paper recommends that the Nigerian government should see inflows of foreign capital as a viable catalyst that can propel the expansion of the country`s industrial sector, and the policymakers in the economy should embark on policy measures that will ensure the sustainability of foreign direct investment inflows and external debt towards the direction of industrial sectors in Nigeria. In the same vein, a more significant percentage of remittances should be tailored towards the industrial sector in the country. If their foreign capital flows are sustained, there will be an industrial revolution in the economy in the nearest future.

This study is limited to facts obtainable from the interactions of aggregate data on capital inflow and industrial output growth in Nigeria between 1987 through 2018.

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