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Does Foreign Direct Investment matter for Industrialisation in Nigeria?

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This paper employs cointegration and error correction techniques to provide empirical evidence on the dynamic relationship between foreign direct investment (FDI) and industrialisation in Nigeria for the period 1981-2015. Our findings show that FDI does not have a significant effect on industrialisation in Nigeria either in the short run or the long run. Also, the empirical results reveal that trade significantly harms industrialisation in Nigeria both in the short run and the long run. Our empirical results are, however, not surprising given that FDI inflows into Nigeria have largely been resource-seeking, that is, mainly targeted at the oil sector with the concomitant adverse impact on the non-oil sectors, particularly the manufacturing sector. We therefore recommend that policy makers should aim at selectively attracting FDI to other strategic sectors which will be supportive of industrialisation.

Keywords:
Foreign Direct Investment (FDI); industrialisation; Nigeria; cointegration; error correction model.

JEL classification:
F23, O14

Introduction

Since the turn of the last two decades, foreign direct investment (FDI) flows between economies have soared along with economic globalisation. Developing countries, emerging economies, as well as transition nations have increasingly come to acknowledge FDI not only as a source of economic development and modernisation but also as a veritable vehicle for income growth and employment. Thus, they no longer view it with suspicion – as a medium of either neo-imperialism or re-colonisation. Consequently, rigid regimes and counterproductive controls that once restricted the easy entry and smooth operations of multinational firms are now being substituted for FDI-friendly policies and programmes. Interestingly, in 2012 and for the first time in history,

developing countries received the lions' share of world FDI at 52%. This was a breakthrough in FDI flows reaching this group of countries (OECD, 2014; Emediegwu & Edo, 2017).

Nigeria has been one of the most favoured FDI-recipient countries in sub-Saharan Africa. FDI inflows into the country have mostly followed an upward trajectory rising from $205 million in 1981 to $4.66 billion in 2014, peaking at $8.84 billion in 2011 (WDI, 2016). Policymakers in Nigeria have over the years made concerted efforts to attract foreign resources in general and FDI in particular upon recognition of its capacity to enhance economic growth and development. Although Nigeria has, on average, experienced significant growth in the past decades, several development and structural indicators reveal the flaws in the growth episodes recorded. High unemployment, poverty and inequality, infrastructural deficits, a limited diversified production structure and export basket, as well as structural rigidities, all coexist with robust growth. This situation has led to recurring calls for industrialisation because of its potential to promote economic diversification, inclusive growth, efficient resource utilization and hence, structural transformation (Economic Report on Africa, 2015).

There is an ongoing discourse on whether FDI can propel industrialisation in developing countries. Søreide (2001) affirms that FDI can reinforce industrialisation via technology transfer and industrial restructuring. Overall, the assumption behind the assertion that FDI fosters industrialisation is quite straightforward: externalities associated with FDI in the form of technology transfer, introduction of new processes and expertise in complex aspects of product development, job creation, productivity gains, and improved market access can result in the expansion of the industrial sector in terms of output and employment. Conversely, there are assertions that FDI may be harmful to domestic firms due to increased competition, thereby engendering deindustrialisation (Kang and Lee, 2011; Barrios, Gorg and Strobl, 2005). Nonetheless, there is paucity of empirical research on the effect of FDI on industrialisation as the focus of extant studies has been on the impact of FDI on economic growth. Thus, this study seeks to fill this gap. In specific terms, this paper aims at empirically ascertaining whether FDI benefits or harms industrialisation in Nigeria.

The organisation of this paper is as follows: the next section reviews previous evidence on FDI and industrialisation, followed by an analysis of the empirical methodology used and the sources and description of the selected data. The main empirical results of the study are presented and discussed in Section 4, while Section 5 concludes with the relevant policy implications.

Stylised Facts on FDI and Industrialization in Nigeria

Trends of FDI inflows into Nigeria

FDI inflows into Nigeria have, over the years, exhibited an upward trend albeit with slight fluctuations. Figure 1 shows that in 1970, it stood at $0.21 billion and rose modestly to $0.47 billion by 1975 with an average value of about $0.32 billion. FDI inflow had a negative value of approximately $0.74 billion in 1980. It dipped significantly from 1980 to 1986 and averaged at $0.24 billion. This period coincided with the economic recession in Nigeria owing to the drastic reduction in oil revenue caused by a crash in world oil prices. Following the introduction of the structural adjustment programme (SAP) in 1986 – an economic recovery programme aimed at restoring macroeconomic growth and stability – there was an upward spiral of the FDI inflow into the country. Specifically, between 1987 and 1994, FDI inflow experienced a slight increase and averaged about $1.26 billion. In general, the 1990s was characterised by huge FDI inflows into the country although there were significant fluctuations between 1995 and 2004. For most years between 2005 and 2015, the inflow of FDI into the economy increased, reaching an all-time high of $8.84 billion in 2011 with an average value of $6.17 billion.

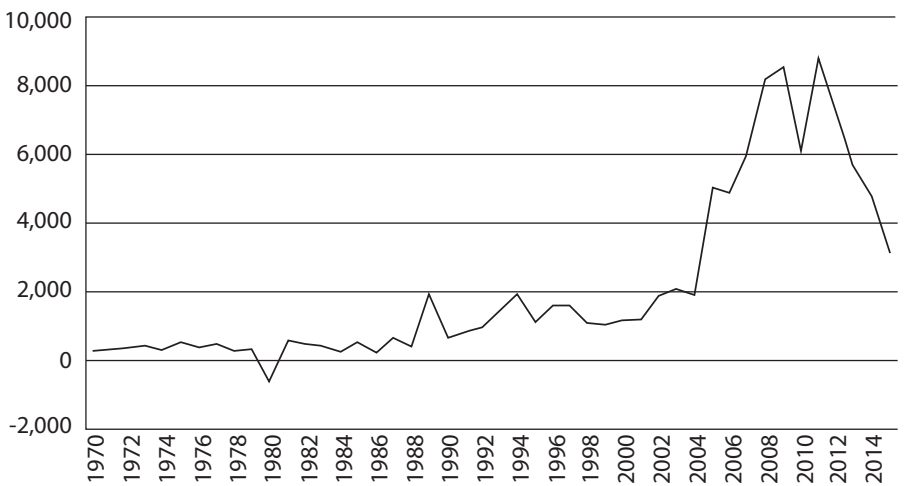

Figure 1: FDI inflows in Nigeria
Source: Authors using data from World Development Indicators (2016)

Industrialisation in Nigeria

Promoting rapid industrialisation in Nigeria has been the focus of several economic policies since her independence in 1960. The policy guide for the development of the industrial sector can be traced to the various national

development plans. It is widely believed that the seed for rapid industrial development was sown in the first national development plan of 1962-1968 which pursued an import substitution industrialisation strategy. The Second National Development Plan (1970–1974) included an indigenisation policy aimed at enhancing the capacity of indigenous entrepreneurs to drive industrial development (Amakom, 2008). Hence, the first indigenisation policy which reserved certain categories of industrial activity, mostly services and manufacturing, for Nigerians was adopted in 1972 (Dagogo, 2014). The Third National Development Plan (1975-1980) was launched during the era of the oil boom. With the attendant increase in revenue, there was massive government investment in the industrial sector and an intense effort to further strengthen the indigenisation process. Thus, the second indigenisation policy was adopted in 1977 (see Amakom, 2008; Emediegwu and Okeke, 2017).

The strategy for industrialisation in Nigeria from the 1960s up to 1985 was mostly inward-looking, that is it was targeted at stimulating local production of manufactured goods for the domestic market; hence, the manufacturing sector became highly dependent on imported inputs. With the oil price crash of the early 1980s and the resultant decline in foreign exchange earnings required to settle huge import bills, the manufacturing sector was adversely affected. Moreover, the global economic recession marred the implementation of the Fourth National Development Plan (1981-1985). The deteriorating economic situation of the early 1980s eventually culminated in the introduction of the structural adjustment programme in July 1986.

SAP-induced policies were mostly outward oriented, that is geared towards export promotion (Ekpo, 2014). The objectives of SAP included stimulating non-oil exports, promoting private sector development, and facilitating the privatisation and commercialisation of state-owned enterprises for increased efficiency. Under SAP, the new industrial policy, as well as the trade and financial liberalisation policy, were enacted in 1989. While the former overturned some of the provisions of the Indigenisation Policy and opened the economy to foreign investors, the latter aimed at stimulating financial efficiency and industrial productivity.

The early 1990s witnessed the adoption of rolling plans. The national rolling plan of 1990-1992 incorporated the industrial master plan (IMP). It was devised to tackle shortage of industrial inputs, infrastructural deficits, and institutional challenges. The rolling plan also formed the bedrock for privatisation and promotion of small scale industries (Dagogo, 2014).

The post-SAP period witnessed the implementation of several policies and programmes aimed at fostering rapid industrial development. Worthy of mention is the small and medium enterprise equity investment scheme

(SMEEIS) and the national economic empowerment and development strategy (NEEDS). The post-SAP approach to the pursuit of industrialisation mainly focused on addressing constraints that could inhibit active participation of potential foreign investors (Ekpo, 2014).

Despite concerted efforts by the government to drive rapid industrialisation in Nigeria, the growth of the industrial sector can at best be described as abysmal despite the mild achievements of the 1970s.

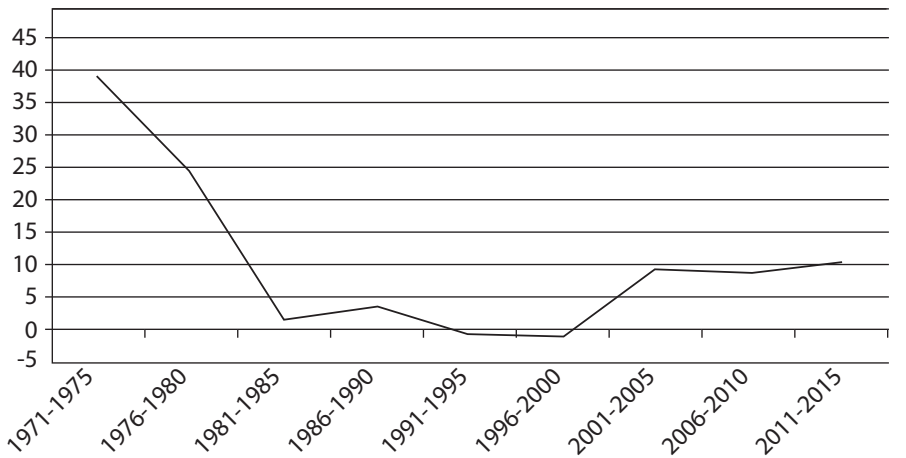

Figure 2: Growth rate of Nigeria's Manufacturing Sector
Source: Authors using data from Central Bank of Nigeria's Statistical Bulletin

Available statistics reveal that industrial output experienced a boost in the 1970s. Specifically, the index of industrial production rose from 41.3 in 1970 to 71.8 and 120.3 in 1975 and 1979 respectively (CBN, 2005). Between 1971 and 1975, the average growth rate of the manufacturing sub-sector was about 39.04%. It declined to 24.2% in the period between 1976 and 1980 and deteriorated significantly to 1.42% for the period 1981 to 1985. There was a slight increase in the average growth rate of the manufacturing sector to 3.54% from 1986-1990 (see, Figure 2). However, the growth rate turned negative during the 1990-1995 and 1996-2000 periods (Aminu, Raifu and Oloyede, 2018). From 2001 to 2015, the manufacturing subsector has experienced some improvement although not up to its 1970s level.

Literature Review

Theoretical Literature Review

The impact of FDI on industrialisation is multifaceted. Castellani and Zanfei (2003)

opined that a very significant factor that supports a favourable impact of inward FDI on the productivity of domestic firms is technological gaps between foreign and domestic firms. They further suggested that a larger productivity gap between the foreign and domestic firms implies a larger potential for technology transfer and productivity spillovers to the latter. Masron and Hassan (2016) termed this assumption, the 'catching up hypothesis'. This hypothesis was derived from the pioneering work of Findlay (1978), who concluded that technological growth in moderately "backward" regions is an increasing function of the distance between their technological level and that of the "advanced" regions, as well as their degree of openness to FDI.

In contrast, in formalising the 'technological accumulation hypothesis', Cantwell (1989) argued that a negative relationship exists between the technological gap of foreign and domestic firms and the absorptive capacity of the latter, consequently, the higher the expected benefits in terms of technology transfer to domestic firms. Masron and Hassan (2016), however, claimed that the role of absorptive capacity is implicitly recognised in the catching up hypothesis, given that a kind of lower bound domestic technological capacity exists, under which FDI is not expected to have any significant positive effects on the domestic economies. Hence, the technological accumulation hypothesis extends beyond the crude notion of absorptive capacity, placing a new emphasis on the ability to absorb and utilise foreign technology as a necessary condition for spillovers to take place.

Søreide (2001) explored two groups of externalities through which FDI may initiate industrialisation: technology transfer, and industrial restructuring. Technology transfer occurs when domestic firms in the FDI-receiving country adopt foreign technology applied by a multinational corporation (MNC). Embracing imported technology has proved to be a *sine qua non* for industrialisation. Despite some degree of patent fee and copyright protection, domestic firms in the host economy that adopt the foreign technology free-ride on the innovative investments made by foreign firms since the cost of such research investment is avoided. Moreover, technology transfers may increase local firms' efficiency, and thus, profitability: however, these depend on the absorptive capacity of domestic firms (Balasubramanyam et al., 1996; Borensztein et al., 1998; de Mello, 1999; Blomströmet.al., 2000).

The second channel, industrial restructuring, occurs when an existing competition is affected by the establishment of an MNC affiliate. The production of a wider assortment of specialised inputs may generate a positive externality to other end-good producers. This concept is termed 'backward linkages'. However, 'forward linkages' can be achieved if more complex goods are locally produced at competitive costs. This eventually leads to industrial development.

Gui-diby and Renard (2015) identified two channels through which the impact of FDI inflows on industrialisation can be analysed: the supply and use

table (SUT) of the economy, and sectoral distribution of jobs. SUT is a table that represents a matrix of national accounts transactions recorded by industries and products during a reference period (usually one year). It records intermediate consumption of different industries by product. In the case of an ongoing process of industrialisation, the input matrix SUT is expected to be modified, and the vector of production by industries is expected to be concurrently altered. They encapsulated the earlier set of effects as 'direct impacts on industrialisation' and the latter as 'indirect impact on industrialisation'.

A major theoretical model that helps to explain the direct impact of FDI on industrialisation was developed by Markusen and Venables (1999). The model defined industrialisation in terms of GDP or value added and suggests that the entry of MNCs produces a double effect – competition and linkage effects. The competition effect arises when MNCs compete with local firms. They further opined that the magnitude of this effect is in direct proportion to the size of the products' surplus available in the market as compared to the initial supply of products without MNCs. However, it is inversely proportional to the domestic firms' productivity. The linkage effects emerge from connections with domestic suppliers. This implies that the proportion of local inputs used by MNCs compared with that used by the local firms determines either the strangulation or survival of the latter. Specifically, when the proportion of local inputs used by MNCs is higher, the exit of the domestic firms will be at hand, and vice versa.

On the other hand, the indirect impacts of FDI on industrialisation stem from the technological transfer that emerges from the entry of MNCs into the manufacturing industry. Fundamentally, technological transfer has the potential to raise the productivity and profitability of a firm. According to Markusen and Venables (1999), technological transfer can be achieved *via* acquisition or licensing of a technology, or through labour mobility. Gui-diby and Renard (2015) posit that growth in the manufacturing industry (in terms of number of jobs and firms) and volume of manufactured outputs (both final and intermediate) would depend on the size and the strength of backward and forward linkages for upstream and downstream firms, respectively. In contrast, horizontal spillovers will rely on the fluidity of the labour market and the capacity to acquire technologies. They added that while there may be an overlap between the two types of FDI-led industrialisation effects – direct and indirect – the cardinal difference is that the direct impacts are related to changes in products or employment, and the indirect impacts relate to transfer of knowledge.

Empirical Literature Review

Different economists have examined the nexus between FDI and economic growth from different perspectives; however, empirical works on the

relationship between FDI and industrialisation are remarkably thin. In his classic paper, Kobrin (1977) used data from 59 developing countries plus multiple regression method to examine the nexus among industrialisation, social change, and the relative economic importance of foreign direct investment. He found the relationship to be interactive with FDI intensifying the pressures for social structure changes produced by industrialisation.

In a later study, de Mello (1999) used time series and panel data from a sample of 32 OECD and non-OECD countries during the period 1970 – 1990 to estimate the effect of FDI on capital accumulation, output and total factor productivity (TFP) growth in the host economy. His result showed that FDI would raise long-run growth in the host economy through knowledge spillovers and technological upgrading. However, such growth depends on the degrees of substitution and complementarity between foreign direct investment and domestic investment.

Using a firm-level balanced panel data on the manufacturing industries in France, Italy and Spain over the period 1992 – 1997, Castellani and Zanfei (2003) studied the effect of FDI on the productivity of domestic firms. Their results indicated positive, significant externalities on Italian firms, negative effect on Spanish firms and non-significant impact on French firms. Doytch and Uctum (2011) used data from 60 countries during 1990 – 2004 to estimate the impact of FDI on manufacturing and service growth. Applying GMM, FE and pooled OLS methods, they found that FDI wields a positive impact on the manufacturing sector in the Caribbean, Latin America, Europe and Central Asia, as well as in middle and low income countries, and in countries with developed manufacturing bases. However, FDI in the service sector could result in deindustrialisation.

Daiyue, Chao and Puel (2012) investigated the linkage between FDI and the process of new industrialisation in China's East, Middle and West regions from 1981 to 2009. Using Granger Causality method, they found that FDI into the Middle region has the most significant promotional effect on the process of new industrialisation, followed by the East, and then, the West. They also reported the long-term equilibrium elasticity of FDI in the East, Middle and West regions as 0.32, 0.39, and 0.19 respectively. They concluded that while a bilateral Granger cause exists between FDI and process of new industrialisation in the middle region, only significant unilateral Granger cause exists in the east and west regions.

In a related study, Adejumo (2013) focused on the linkage between foreign direct investment and the value added to the manufacturing industry in Nigeria from 1970 to 2009. Adopting a time series approach, as well as an autoregressive distributed lag (ARDL) approach to establish the long run relationship amongst

the variables and the short-run dynamics of the model, he concluded that in the long run, FDI has a negative impact on the Nigerian manufacturing sub-sector. The author attributes his counterintuitive finding to Nigeria's inability to host efficient segments of the global supply chains other than the manufacture of finished goods for the domestic market.

On their part, Gui-diby and Renard (2015) used panel data from 49 African countries over the period 1980 to 2009 to investigate the relationship between inward FDI and the industrialisation process in Africa. Their results showed that while other control variables, such as the size of the market, the financial sector, and international trade were important, FDI impact on industrialisation was insignificant.

More recently, Masron and Hassan (2016) focused on the Malaysian manufacturing sector for the period 1999 to 2008 to investigate the spillover effects of US FDI on the Malaysian economy. Applying seemingly unrelated regression (SUR) method, they found that FDI inflows into various sectors within the manufacturing industry do not guarantee positive spillover effects.

Methodology

Model Specification

In line with existing literature on FDI-industrialisation nexus, a simple model showing the likely determinants of industrialisation is specified as:

$$IND, = f(FDI,GFCF,PCY,EDU,TRADE,AGRIC) \quad (1)$$

where: IND is industrialisation, FDI represents foreign direct investment, GFCF is gross fixed capital formation, PCY represents per capita income, EDU is education, TRADE is trade openness and AGRIC represents value added of agricultural sector. Industrialisation is measured by manufacturing value added as a percentage of gross domestic product (GDP); foreign direct investment (percentage of GDP) is used to capture FDI; gross fixed capital formation is used to capture the level of domestic investment; per capita income is measured by gross domestic product per capita; education is measured by secondary school enrolment; trade is measured as the ratio of the sum of imports and exports to GDP; and AGRIC is the value added of agriculture as a percentage of GDP.

The estimable form of equation (1) is specified in logarithmic form as:

$$LIND_t = ß_0 + ß_1 LFDI_t + ß_2 LGFCF_t + ß_3 LPCY_t + ß_4 LEDU_t + ß_5 LTRADE_t + ß_6 LAGRIC_t + \mu_t \quad (2)$$

where *'L'* represents log.

A priori, we expect the coefficients of LFDI, LGFCF, LPCY, LEDU to be positive, that of TRADE to either be positive or negative and the coefficients of AGRIC to be negative. That is $ß_1, ß_2, ß_3, ß_4. \succ 0$, $ß5 \succ$ or $\succ 0$ and $ß6 \succ 0$

Investment, whether domestic or foreign, is a critical variable for industrialisation. For developing countries with capital constraints, external finance may be necessary to augment the level of domestic investment, and one of such sources of external finance is FDI. Overseas investments by multinational firms has the potential to expand manufacturing output thus increasing its value added by engendering productivity growth, technology transfer, more efficient organisational form and management process, as well as expansion of international market access. A major argument in favour of multinational firms is that they have access to latest and advanced technologies which can be transferred to the host countries (Todaro and Smith, 2012) thereby spurring the growth of the manufacturing sector.

In addition, per capita income which serves as a measure of the level of income and market size should positively impact industrialisation. Sachs and Warner (1999) from the big push logic assert that industrialisation requires some large demand expansion to serve as incentives for entrepreneurs to incur the fixed costs associated with it. Therefore, any factor capable of stimulating demand and expanding market access will likely be beneficial for industrialisation. A rise in per capita income can stimulate demand. Furthermore, we expect education to promote industrialisation given that a well-educated human resource is necessary to manage both the financial and technical resources required for industrialisation. Moreover, an educated workforce will facilitate the process of adopting and adapting existing technology to suit domestic production (Benhabib and Spiegel, 1994).

Again, openness to international trade has been identified as a key strategy for industrialisation. This is because it can produce important supply-side effects which result in efficiency gains, provide access to international markets, expand the size of the domestic market and serve as a conduit for technological advancement. Moreover, further liberalising of trade makes imports cheaper, thereby facilitating the acquisition of new inputs and higher-quality intermediate goods (Agenor, 2004). This notwithstanding, deficient local conditions, as well as lack of adequate protection for infant industries, may imply that increased trade openness can be corrosive to industrialisation as international competition may hamper the growth and survival of small domestic firms. Besides, open markets may serve as transmission channels for external shocks which can negatively impact the manufacturing sector.

Industrialisation is closely associated with a decline in the agricultural sector and increase in the manufacturing sector. Thus, we expect the value added of agricultural sector to be negatively associated with industrialisation in line with the argument of Gui-Diby and Renard (2015).

Estimation Technique

The objective of this paper is to examine the relationship between FDI and industrialisation using data for Nigeria. We utilise the error correction method (ECM) to achieve our objective. We, therefore, specify the ECM representation of equation (2) as follows:

$$\Delta LIND = ß_0 + ß_1 \Delta LFDI + ß_2 \Delta LGFCF + ß_3 \Delta LPCY + ß_4 \Delta LEDU + ß_5 \Delta LTRADE + ß_6 \Delta LAGRIC + \psi ECM_{-1} + \mu$$

where all the variables are as previously defined; L shows that the variables are in their log form, Δ is the difference operator, ECM is the error correction term which is the residual obtained from the long run estimation and is the speed of adjustment parameter.

Before estimation with ECM, we conduct a test for the stationarity properties of the variables and establish the order of integration using the Augmented Dickey-Fuller (ADF) unit root test. This is necessary to avoid spurious regression results usually associated with the use of non-stationary variables. A test for cointegration is also conducted to ascertain the existence or otherwise of a long run relationship using the Engle-Granger as well as the Johansen cointegration techniques. Once a cointegrating relationship is established, it implies that a long-run relationship exists among the variables and both the short-run dynamics and the speed of adjustment to long-run equilibrium from a possible short-run distortion can be analysed.

Data Description and Sources

This study employs annual time-series data on seven variables namely: industrialisation measured by manufacturing value added, foreign direct investment, gross fixed capital formation, gross domestic product per capita (per capita income), secondary school enrolment rate (education), trade (measured as the ratio of the sum of imports and exports to GDP) and value added of the agricultural sector for the period 1981 to 2015. Figure 3 shows the trend of each series for the given time period. The data set used was sourced from World Development Indicators (WDI) (2015).

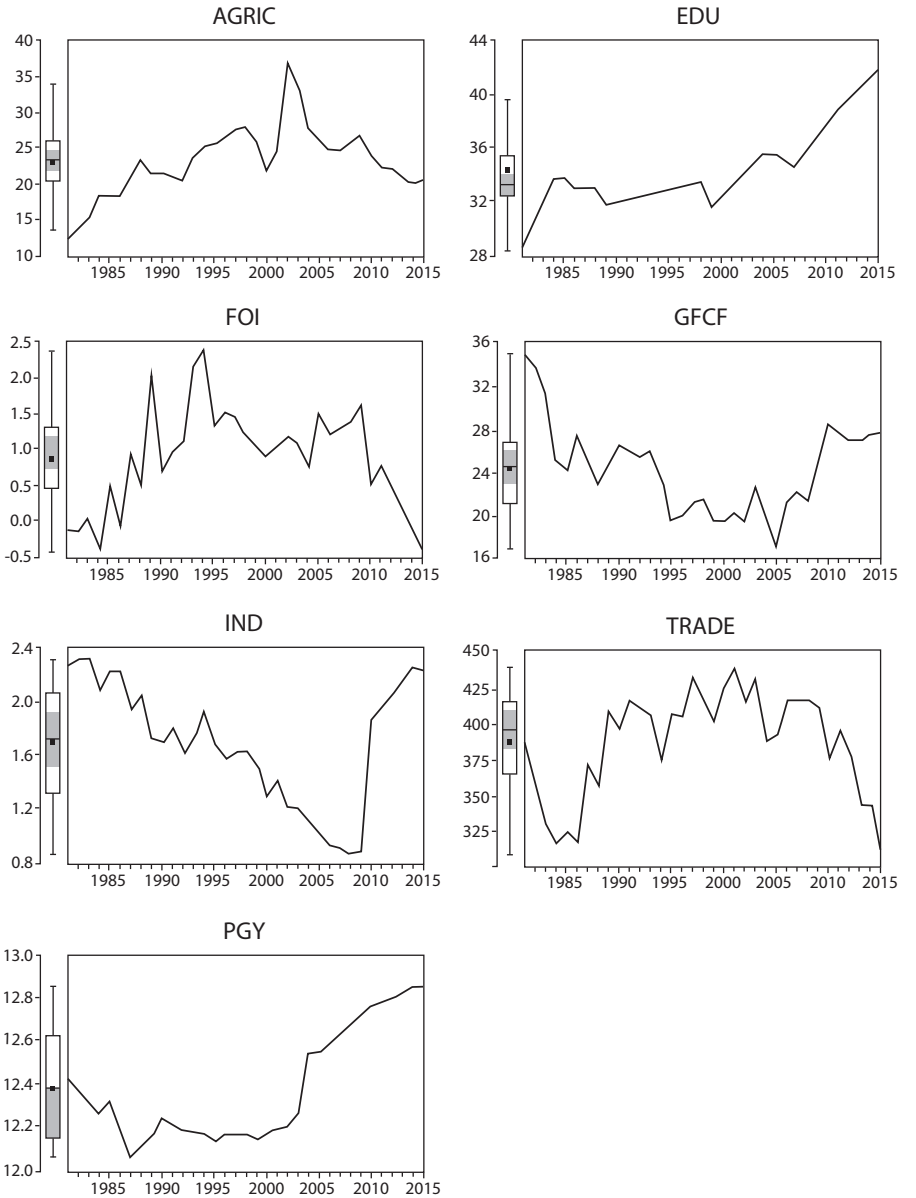

Figure 3: Series of Variables (log-transformed)

Presentation and Discussion of Empirical Results

In this section, we present the summary statistics of the variables employed in this study and discuss the results of our pre-estimation, estimation and post-estimation

tests. The pre-estimation test is the unit root and cointegration tests; estimation test is done using the error correction method, while post-estimation tests include diagnostic tests for normality, serial correlation, heteroscedasticity, and stability test.

Table 1: Summary Statistics of Variables

Variables	Obs	Mean	Std. Dev	Min	Max
LIND	35	1.697066	0.460365	0.879681	2.345383
LFDI	35	0.895094	0.692894	-0.409899	2.382556
LGFCF	35	2.440962	0.426666	1.697265	3.561650
LPCY	35	12.36577	0.253208	12.05759	12.85585
LEDU	35	3.409461	0.280234	2.833717	4.112947
LTRADE	35	3.897421	0.349074	3.161623	4.404434
LAGRIC	35	3.477302	0.209565	3.007449	3.882922

Pre-estimation Test

Unit Root Tests

The results for the stationarity properties of the variables using the Augmented Dickey-Fuller (ADF) unit root test type are presented in Table 2. The ADF test is based on the null hypothesis that the variables are not stationary against the alternative hypothesis that they are stationary.

Table 2: Unit Root Test Results

Augmented Dickey-Fuller (ADF) Unit Root Test					
Variables	**Levels**		**First Difference**		
	ADF Test Statistics	**5% Critical Value**	**ADF Test Statistics**	**5% Critical Value**	**Decision**
LIND	-1.446815	-2.951125	-5.673249*	-2.954021	Stationary
LFDI	-2.535220	-2.951125	-9.753136*	-2.954021	Stationary
LGFCF	-2.857276	-2.954021	-3.330520*	-2.960411	Stationary
LPCY	-0.443495	-2.951125	-4.346743*	-2.954021	Stationary
LEDU	0.024923	-2.951125	-3.862103*	-2.954021	Stationary
LTRADE	-1.909717	-2.951125	-7.455053*	-2.954021	Stationary
LAGRIC	-1.823826	-2.951125	-6.056877*	-2.957110	Stationary

Source*: computed by the authors using E-views 9*

Notes:

The rejection of the null hypothesis of non-stationarity is based on MacKinnon (1996) critical values.

*, **and *** represent 1%, 5% and 10% level of significance respectively

From Table 2, the results of the ADF unit root test show that all the variables contain a unit root - that is, they are not stationary at level. However, these variables become stationary after first differencing, in line with the argument by Box and Jenkins (1970). Although the variables are non-stationary at levels, it is possible that a linear combination of the variables is stationary, implying that they could be cointegrated. We thus employ the Engle-Granger two-step procedure and the Johansen test for cointegration.

Cointegration Test

There are several alternative ways to conduct cointegration tests – Engle-Granger and Johansen cointegration procedures. While the Engle-Granger cointegration test is appropriate for single equation model and I(1) series, Civcir (2003) posits that its small sample properties have been queried in the existing literature and attests to the superiority of the Johansen cointegration test in handling simultaneity bias and potential endogeneity. Although we employ both methods, only the result of the Johansen cointegration test is presented and analysed, as there are no significant differences in them. (Results from Engle-Granger test are available on request.)

Table 3: Johansen Cointegration Test Result

Hypothesised No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Max-Eigen Statistic**	**0.05 Critical Value**
None*	0.994217	353.5950	150.5585	159.7354	50.59985
At most 1*	0.936776	193.8596	117.7082	85.59337	44.49720
At most 2*	0.764305	108.2662	88.80380	44.80176	38.33101
At most 3	0.564110	63.46448	63.87610	25.74135	32.11832
At most 4	0.468963	37.72313	42.91525	19.62066	25.82321
At most 5	0.254531	18.10247	25.87211	9.105990	19.38704

From the results in Table 3, both the Trace test and the Max-Eigen value test indicate the existence of three cointegrating equations at the 0.05 level. Thus, we reject the null hypothesis that there is no cointegration. The results above suggest the existence of a long run relationship among the variables.

Model Estimation Results

The results for the long run estimated model is presented in Table 4.

Table 4: Linear Multiple Regression Result (Long-run)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-21.77697	2.489284	8.748286	0.0000
LFDI	-0.028444	0.059502	-0.478033	0.6365
LGFCF	0.616178	0.100764	6.115042	0.0000*
LPCY	-1.494554	0.221576	-6.745113	0.0000*
LEDU	0.614000	0.210369	2.918688	0.0070*
LTRADE	-0.593648	0.124370	-4.773260	0.0001*
LAGRIC	-0.821618	0.186176	-4.413114	0.0001*
R-squared		0.905026		
Adjusted R-squared		0.883921		
Durbin-Watson statistic		1.735772		
F-statistic		42.88150		
Prob (F-statistic)		0.000000		

Source: Authors' computation

Notes

*, **and *** represent 1%, 5% and 10% level of significance respectively

The long-run static regression results indicate that GFCF, EDU, TRADE and AGRIC have the expected signs but FDI and PCY do not have the expected sign. Five variables, namely GFCF, PCY, EDU, TRADE and AGRIC are statistically significant at 1%, but FDI does not seem to impact industrialisation in Nigeria significantly. In specific terms, the coefficient for FDI is negative but insignificant. Similarly, PCY, TRADE and AGRIC also adversely affect industrialisation as their coefficients suggest that a 1% increase will impede the process of industrialisation by about 1.49%, 0.59%, and 0.82% respectively. However, GFCF and EDU exert a positive influence on industrialisation as their coefficients show that a 1% increase will enhance industrialisation by about 0.61%.

Although some of the coefficients do not conform to *a priori* expectations, the empirical results obtained are not puzzling. While FDI has the potentials to drive industrialisation by being a direct source of external finance and a conduit for technology spillovers, the sectoral destination is more important. FDI flows to Nigeria have not been channelled to the manufacturing sector. It is mainly concentrated in the extractive (oil) sector and more recently in the communication (service) sector (see Ayanwale, 2007). This may be one of the likely reasons for its insignificant effect on industrialisation. Also, the positive effect of domestic investment measured by GFCF

on industrialisation may not be unconnected with series of financial sector reforms that have enhanced the investment climate, although policy implementation and efforts appropriate to boost investment in the real sector need to be intensified.

Our results for trade and per capita income are also not far-fetched. Gui-Diby and Renard (2015) affirm that existing literature has identified the level of income and trade as possible factors that can stall industrialisation and even spiral de-industrialisation as rising income levels may lead to a shift in consumption patterns from non-processed goods to manufactured goods and then to services. Contrary to the maxim that international trade can generate advantages such as market expansion, technological and knowledge spillovers, efficient allocation of resources etc., our results show that trade has not promoted industrialisation in Nigeria. A plausible explanation for this is evident in the structure and composition of Nigeria's foreign trade which is dominated by oil exports and has consequently increased the vulnerability of the manufacturing sector to external shocks.

Also, it is logical to conclude from our findings that an educated workforce is critical for industrialisation. Unarguably, proper education and training can raise the productivity of a worker as well as enhance his ability to manage the financial and technical resources essential to drive the process of industrialisation. Our empirical finding on the effects of FDI, trade and education on manufacturing value added is consistent with that of Adejumo (2013).

Table 5: Results of Error Correction Model

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.002468	0.028973	-0.085172	0.9328
D(LFDI)	-0.036854	0.051068	-0.721665	0.4772
D(LGFCF)	0.456460	0.121281	3.763650	0.0009*
D(LPCY)	-1.103684	0.444590	-2.482474	0.0201**
D(LEDU)	0.394099	0.349313	1.128211	0.2699
D(LTRADE)	-0.541174	0.130453	-4.148413	0.0003*
D(LAGRIC)	-0.501903	0.180150	-2.786022	0.0100*
ECM(-1)	-0.841786	0.195237	-4.311614	0.0002*
R-squared		0.683349		
Adjusted R-squared		0.594687		
F-statistic		7.707342		
Prob (F-statistic)		0.000055		
Durbin-Watson statistic		1.9551657		

Sources: Authors' computation

Notes

* , ** and *** indicate significance at the 1%, 5%, and 10% level respectively.

The results of the error correction model presented in Table 5 capture the short-run dynamics between the dependent variable and the explanatory variables. The coefficient of the error correction term has the expected negative sign and is statistically significant at the 1% level. This implies that long-run equilibrium will be restored after short-run disturbances. Specifically, the absolute value of the error correction term (84%) indicates that the speed of convergence to long-run equilibrium is remarkably high, thus manufacturing value added adjusts very quickly towards the long-run equilibrium position after short-run distortions. Any disequilibrium will be corrected in less than one year.

The overall fit of the model is moderate with an adjusted R-Squared value of approximately 0.59. This means that all the explanatory variables explain about 59% of the systematic variation in manufacturing value added (industrialisation). The F-statistics of 7.707 is highly significant at the 1% level, validating the existence of a relationship between industrialisation and the explanatory variables. Also, the Durbin-Watson statistic of 1.955 shows that the model is free of serial correlation.

Post estimation Tests

In this section, we present and discuss the results of our diagnostic tests. These tests are conducted to ensure that the results are not in violation of any of the crucial properties and assumptions of the ordinary least squares (OLS) regression method. They are also useful for ascertaining the validity of our estimates and their reliability for policy analysis.

Diagnostic Tests

Table 6: Diagnostic Tests Results

	F-statistic	**Prob**
Normality Test (Jarque-Bera)	0.7819	0.6763
Breusch-Godfrey Serial Correlation LM Test	0.1565	0.9243
Heteroskedasticity Test (ARCH)	0.0170	0.8968

The Jarque-Bera normality test shows that the model is normally specified while the result of the Breusch-Godfrey serial correlation LM test indicates that there is no serial correlation in the model. Also, the autoregressive conditional heteroscedasticity (ARCH) test indicates the absence of heteroscedasticity in the model. Thus, the diagnostic results imply that the model is efficient as none of the crucial assumptions of OLS is violated.

Stability Analysis

The stability of the model is examined using the plots of the cumulative sum of recursive residual (CUSUM) and the cumulative sum of squares residual (CUSUMSq). The plots are shown in Figures 4 and 5 below.

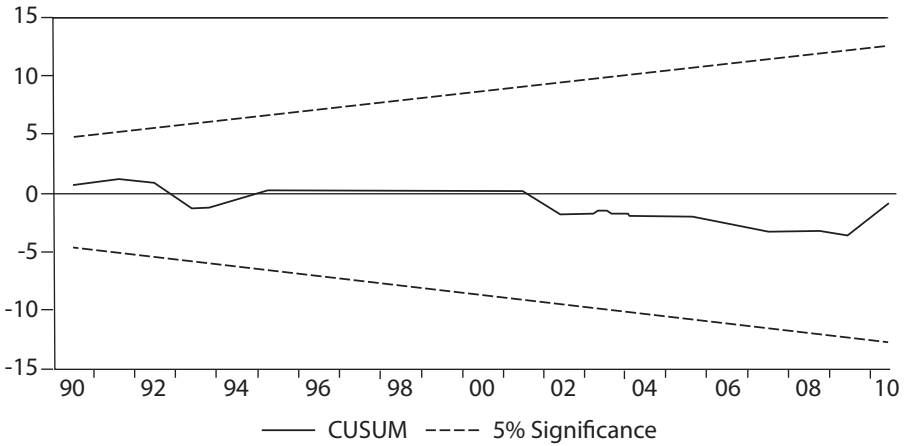

Figure 4: Plot of Cumulative Sum of Recursive Residuals (CUMSUM)

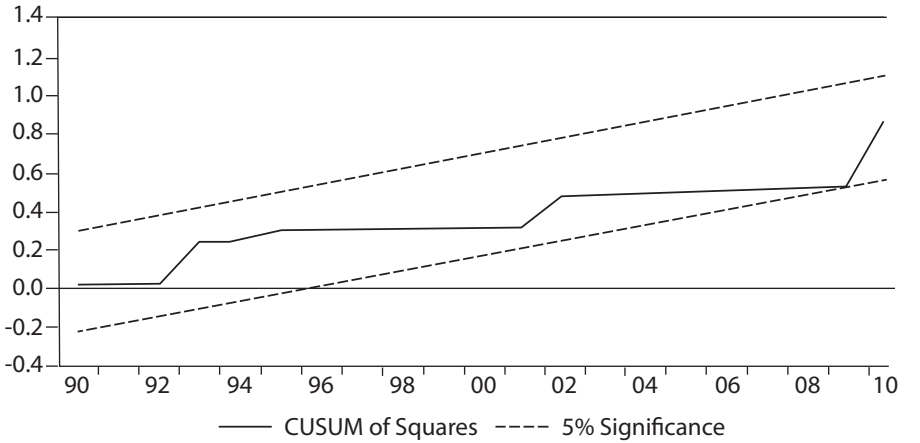

Figure 5: Plot of Cumulative Sum of Squares Residuals

The Figures show that the plots of CUSUM and CUSUMSQ lie within the 5% critical bound, thus providing evidence that the model is stable and therefore suitable for policy discussions.

Conclusion and Policy Recommendations

This paper employs cointegration and error correction method to examine the relationship between FDI and industrialisation in Nigeria with data spanning 1981–2015. Our empirical results show that FDI is a negative and insignificant determinant of industrialisation in Nigeria both in the short run and long run. It is imperative to state that the result is unsurprising given that FDI inflows in Nigeria have been concentrated in the extractive sector and more recently, the communication sector, rather than in the manufacturing sector. Another plausible explanation for the result may be the "absorptive capacity hypothesis" which holds that the beneficial effects of FDI spillovers are conditional on complementary domestic conditions such as an educated workforce, institutional and infrastructural quality, well developed financial system and favourable business climate (Jude and Levieuse, 2013).

Also, we find that trade both in the short run and long run significantly harms industrialisation in Nigeria. This result can be explained from the perspective of Nigeria's trade structure which is largely dominated by oil exports, imports of manufactures, as well as a bias in favour of foreign consumables. Nigeria's narrow export base dominated by the extractive sector (crude oil) subjects the manufacturing sector to the boom and bust cycles associated with fluctuations in crude oil prices. In addition, Nigeria's trade practice is not geared towards promoting value addition which has become a necessary condition for industrialisation in today's global economy (Economic Report on Africa, 2015). Furthermore, capital accumulation both physical and human is necessary for industrialisation in Nigeria as suggested by our empirical output.

Based on our empirical findings, we provide suggestions because Nigeria's efforts to achieve FDI-led industrialisation have been unimpressive in the past three decades. It is a truism that the gains of FDI are not automatically and evenly distributed across sectors. Spillovers and backward linkages are very crucial in guaranteeing that FDI contributes to structural transformation and growth; hence policies and programmes must be geared towards these objectives (Sutton et al., 2016). In this context, the country should selectively attract FDI with high level of manufacturing and technological contents, which will be supportive of industrialisation. Hence, there should be a paradigm shift from attracting multinational corporations (MNCs) which are merely sales subsidiaries to attracting foreign firms that encourage value adding manufacturing in Nigeria. Furthermore, to quell the subjugation of domestic firms by the foreign ones, there has to be some level of synchronisation between the two. Consequently, government at different levels should galvanise efforts to design the appropriate policy environment and incentive structures that would focus on attracting high-technology oriented foreign firms while allowing local entrepreneurs to

take on the task of promoting other sectors that serve as backward linkages to the MNCs. This would eventually pave the way for the process of export-led industrialisation.

In addition, trade policy and practices must be deliberately tailored towards promoting industrialisation. Again, the presence of sufficient domestic institutions and complementary policies are necessary. There is need for investment in infrastructure such as electricity, roads, and sectors with forward and backward linkages necessary to lower production costs and boost manufacturing value added as well as investment in research and development.

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