Inward FDI and Manufacturing Sector Productivity: Empirical Evidence from Nigeria

Udi Joshua[1], Josephine Japhet Wubon[2], Seth Nyawebowe Arastus[3] & Ayobami Temitope Owolabi[4]

[1] Federal University Lokoja, Department of Economic, udijoshua@yahoo.com, Orcid Id: 0000-0002-7862-0547

[2] Taraba State University Jalingo, Department of Economic, joybt.2014@gmail.com, Orcid Id: 0000-0003-0313-5245

[3] University of Abuja, Faculty of Social Science, Department of Economics, setharastus@gmail.com, Orcid Id: 0000-0002-4260-617X

[4] Federal University Lokoja, Department of Economic, bmtemitope@gmail.com, Orcid Id: 0000-0002-5376-1204

A B S T R A C T

The real sector for which the manufacturing sector is part play key role in the quest for achieving economic growth of any country. Naturally, high output in the manufacturing sector will contribute significantly to increase in economic growth. However, the productivity of the manufacturing sector is directly dependent on the capital-labour ratio performance. Thus, this study seeks to examine the impact of capital (FDI inflow) and labour (domestic labour) on the manufacturing sector output in Nigeria. The choice of ARDL approach by this study is informed by the mixed order of integration from the unit root test. The finding indicates that capital significantly and positively promotes the manufacturing sector output in Nigeria, while labour influences the manufacturing sector performance in a positive and insignificant way. Further result proves that the impact of labour is elastic, indicating that a little change in labour will cause a drastic change in the level of output in the manufacturing sector. In general, the manufacturing sector is capital-driven rather than labour-driven. A recommendation is made of the need for a systematic human capital development through improvement in education and training system to increase the efficiency of labour. Secondly, since FDI inflow demonstrates significant positive impact, the authority concern should formulate policy that will attract more FDI inflow into the sector for higher productivity. Such policy include, tax holidays, stable exchange rate, reasonable interest rate to enable investors gain access to fund in the domestic economy as well as general stability of the macroeconomic environment to enable smooth flow of investment.

Before the advent of the technical progress as one of the determining factors of production as supported by the traditional neoclassical growth model, labour and capital has been the factors of production. The theory submits that labour-capital ratio is mainly responsible for growth rate in an economy. This shows that economic growth is a direct function of a simultaneous combination of labour and capital in the productive stream of an economy. More so, in an open economy like Nigeria, the nation market will attract extra domestic and foreign investment which in turn increases the rate of capital accumulation. Specifically, the foreign direct investment which represent capital component of the model of this study is empirically proven to be a promoter of output growth in the manufacturing sector. For instance, Afamefuna Angus, Nnaji and Nkalu (2019) examined the empirical effect of FDI inflow on the output of the manufacturing sector in Nigeria. The finding proved that there is a long run connection between FDI inflow and economic growth which validated the unidirectional causal effect running from FDI inflow to the manufacturing sector output. Li, Liu and Parker (2001) subscribed to the positive and significant impact of FDI inflow on economic growth.

Similarly, there are factors responsible for the inflow of FDI. Aurangzeb and UI Haq (2012) and Joshua (2020) concluded that foreign capital inflow is influenced by some factors in the home economy. These includes the rate of economic growth (market size), education system, institutional environment, tax laws, and overall macroeconomic and political environment. (Hernandez-Coss & Bun, 2006) submit from their study that Nigeria is the leading economy in receiving remittances that flow into Sub-Saharan Africa. According to the study, one of the common characteristic of the emerging economies like Nigeria is low saving or low capital formation which cannot meet the investment need of domestic economy. The study further stressed

that most of these emerging economies are characterized by gross inadequate capital formation and income, saving ratio and low investment. This has demonstrated a hindrance to the collection of taxation revenue generation, thereby leading to government revenue depletion.

In recent time, FDI inflow to Nigeria begin to fluctuate significantly particularly from the time of the first recession experienced in 2015. For instance, FDI inflow to Nigeria dropped from 1.09% in 2016 to 0.93% in 2017 united nation conference on trade and development (UNCTAD, here after). The Nigerian economy which is the leading economy in Africa suffered another sharp decline in FDI inflow which is presumed to be associated with economic depression that hit the country in 2018 and the prolonged insecurity in the North-East orchestrated by the Boko Haram insurgency. According to the united nation conference on trade and development (UNCTAD, 2018) many foreign investors shut down their investment and left the country, noticeably are the consumer base firms from South Africa. Within this period, FDI inflow into West African sub-region falls by 11 percent amounting to $11.3 billion out of which Nigeria accounted for 21% equivalent to $3.5 indicating a decline comparatively (UNCTAD, 2018). Furthermore, data on inflows into Nigeria for 2019, by type of investment, indicates that loan capital and portfolio investment relative to FDI inflow, constitute the largest part of the total investment. Normally, the gaps in the budget financing and the real sector of the economy are often fund in part by foreign direct investment. The threats to FDI inflow from both the political and economic environments are indication that emerging economies will be starved of capital resulting in larger budget financing gaps, wider savings-investment, less aid and fewer willing lenders.

It is imperative to state that Nigeria is an emerging economy with a population estimated at 200million from which the national workforce or human capital are extracted. Tartiyus et al. (2015) submitted that there exist positive relationship between economic growth and population. Corvers (1997) opines that labour force exhibit positive impact on the productivity of the manufacturing sector. However, the reciprocal impact of FDI inflow on economic growth has remained contentious. This is buttressed by the fact that Nigeria is highly populated and endowed with adequate human capital coupled with the high level of FDI inflow yet the rate of economic growth seems deteriorating at an alarming level particularly in the recent time. This call for the need to re-examine the level of the contribution of FDI inflow and the labour force on the productivity of the manufacturing sector. Besides, the previous studies such as Agu and Okoli (2015) and Mwakanemela (2014) adopted ordinary least square (OLS) method. This study seek to employ the dynamic ARDL approach for the purpose of analysis. One of the advantage of the ARDL over the traditional method is that, it estimate both the short run and long run impact of the regressor on the targeted variable which give room to analysis the robustness of the model.

1. EMPIRICAL REVIEW

The impact of capital in the form of FDI inflow is still very much contentious in the literature today. While other studies subscribed to the positive impact of FDI inflow, other studies content with such claim. For instance, Joshua, Babatunde and Sarkodie (2021) ascertained that FDI inflow exhibit a significant positive impact on economic growth of the sub-Saharan Africa. This outcome is supported by the works of Joshua and Alola (2020) Joshua, Rotimi and Sarkodie (2020) and Joshua, Adedoyin and Sarkodie (2020). Banga (2006) examined the impact of FDI inflow on the India manufacturing sector and found that the impact on export is positive particularly for the FDI from US. The study added that the diversification of export in India is also promoted by FDI inflow from US in line with the works of Bardesi (2016) and Jordaan (2008). Masron, Zulkafli and Ibrahim (2012) examined the effect of FDI inflow on the manufacturing sector and found a mixed results. While FDI inflow affect output positively in one sector within the manufacturing sector, reverse is the case in other sectors. Wang (2009) carried out a panel study on the Asian economies investigating the impact of FDI inflow on economic growth. The outcome suggested that when FDI flows into the manufacturing sector, it promote economic growth by increase the output of the manufacturing sector. Afamefuna Angus, Nnaji and Nkalu (2019) examined the empirical effect of FDI inflow on the output of the manufacturing in Nigeria. The result proved that there is a long run associate between FDI inflow and economic growth which is cemented by the unidirectional causal effect running from FDI inflow to the manufacturing sector output. The Submission of Li, Liu and Parker (2001) claimed that the positive impact of FDI inflow is mostly felt by the private firms rather than the state own industry. Nikoloski (2017) found that FDI inflow promotes employment in the manufacturing sector and by extension increase the output growth of the sector in Macedonian. The work of Nikoloski (2017) submited that FDI inflow demonstrates positive effect on the productivity of the home firms, and that the effect is larger for the low-technology gap than for the high-technology-gap. Fauzel, Seetanah and Sannasee (2015) found a positive and insignificance impact of FDI inflow on the productivity of the manufacturing sector in Mauritian. In the case of Morocco, Azeroual (2016) found mixed outcome. While FDI inflow from France exhibits negative impact on industries, reverse is the case with FDI inflow from the Spain. FDI inflow from Spain demonstrates positive and significant impact on the productivity of the manufacturing sector. Adejumo (2013) submitted that the effect of FDI inflow on the manufacturing sector in the long run is negative in Nigeria. Bakar (2019) investigated the role of FDI inflow in promoting the performance of the manufacturing sector in Pakistan. The outcome proved that FDI inflow positively influenced the productivity of the manufacturing sector in the long run. Agu and Okoli (2015) found positive effect of FDI inflow on the manufacturing sector but only in the long run in Nigeria. The study of Anowor, Ukweni,

Ibiam and Ezekwem (2013) revealed a positive and significant connection between FDI inflow and the manufacturing sector in Nigeria. Further finding states that all the regressors for which FDI inflow is one explains the variation in the output of the manufacturing sector cementing the work of Vu (2016). The study of Birsan, Moraru, Cramarenco and Andrei (2005) and Qiu et al. (2009) found positive connection between FDI inflow and economic development and the human capital development. Idoko and Taiga (2018) confirmed the long run association between FDI inflow and economic growth in Nigeria which aligned with the work of Joshua (2019) and Joshua and Alola (2020) Joshua, Rotimi and Sarkodie (2020) and Joshua, Adedoyin and Sarkodie (2020).

In contrast, Lean (2008) tested the impact of the presence of FDI inflow on the manufacturing sector growth in Malaysia. The outcome suggests that there is no interaction between the two variables in the long run. Further result, opined that the precondition to harness the potential of FDI inflow by the manufacturing sector in future is link to the availability of skilled labour force. Orji, Anthony-Orji, Nchege and Okafor (2015) investigated the connection between FDI inflow and the output of the manufacturing sector. The finding suggested that there is a negative connection between the variables. Azeroual (2016) examined the impact of FDI inflow on the productivity of the manufacturing sector. The outcome proved that FDI inflow from France exhibits negative impact on the growth of output in the manufacturing sector. Turnbull, Sun and Anwar (2016) revealed that the impact of FDI inflow on the productivity of the manufacturing sector is insignificant.

2. DATA AND METHODOLOGY

2.1. Sources of data

Data from secondary source were gather for this research work. Specifically, the study obtain annual time series data for Nigeria from 1981 to 2018. The population (measured the workforce age group) and GDP per capita (measured in constant 2010 US dollars), while FDI (measures the foreign direct investment, net inflow as % GDP) were all sourced from (WDI, 2020).

2.2. Model Specification

This study majorly seek to examine the contribution of capital and labour to the manufacturing sector productivity in Nigeria. To this end, FDI inflow represent capital while population stand for the labour. The aim is to ascertain the level of contribution of capital relative to labour force. Thus, the functional model is expresses as:

$$MAF = f(FDI, LF) \tag{1}$$

$$LnMAF = \beta_0 + \beta_1 LnFDI + \beta_2 LnLF + \mu_t \tag{2}$$

Where;

LNGDP = Logarithmic value of Gross Domestic product

LNLF = Logarithmic value of labour force

LNFDI = Logarithmic value of Foreign Direct Investment

μ_t = Error term

β_i = The parameter for estimation.

2.3. Stationary Test

Macroeconomic variables are normally trending which makes them difficult to be stationary at level. Thus, unit root test is a procedure that determine their level of stationarity Gujarati (2009). The essence is to avoid spurious regression which may misguide policy makers Joshua, Salami and Alola (2020) and Joshua (2020). Consequently, this study employed the common ADF (1981) and PP (1988) for stationarity tests. Thus, the general formula for these widely known unit root test is as stated below;

$$\Delta Y_t = \alpha_1 + \alpha_2 + \delta Y_{t-1} + \sum_{i=1}^{m} \beta_i \Delta Y_{t-i} + \varepsilon_t \tag{3}$$

Where, Gaussians white noise that is assumed to have a mean value of zero is represented by ε_t, and possible autocorrelation represent series to be regressed on the time t.

2.4. Cointegration Approach

Although the dynamic ARDL approach can be adopted for any order of integration, ARDL cointegration technique is preferable when dealing with variables that are integrated of different order, I(0), I(1) Joshua, Adewale and Uzumba (2021), Joshua, Ameh and Alola (2021) and Nkoro and Uko (2016). The test for cointegration became necessary because of the fact that macroeconomic variables normally take a drift walk. ARDL help to detect the long run association of the variables of interest. The formular is as follows:

$$\Delta Z = \mu_0 + \mu_1 t + \varepsilon_1 \delta_{t-1} + \sum_{i-1}^{n} \sigma_1 v_{it-1} + \sum_{j-1}^{k} \phi_j \Delta Z_{t-j} + \sum_{i-1}^{n} \sum_{j-1}^{k} \omega_{ij} \Delta V_{it-j} + \Upsilon D_t + \varepsilon_t \tag{4}$$

$$H_0 : \beta_1 = \beta_2 = \dots = \beta_{n+2} = 0$$
$$H_1 : \beta_1 \neq \beta_2 \neq \dots \neq \beta_{n+2} \neq 0$$

The reject of the H_0 implies that the series converged in the long run and vice versa.

3. THE PRELIMINARY TEST RESULT AND INTERPRETATION

This section presents the preliminary tests which includes the summary statistic and the correlation matrix and the result confirms that the manufacturing sector output has the highest mean follow by labour. Similarly, the standard deviation of the manufacturing sector is larger than the other variables under investigation. The correlation matrix indicates that there exist a strong connection only between labour and the manufacturing sector. Moreover, the unit root test result proved that only FDI inflow is stationary at level and at 1% level of significance. However, at first differencing, the manufacturing sector and labour turn out to be stationary which represent a mixed order of integration. This suggest the adoption of the ARDL approach as the best method for estimation Joshua Adewale and Uzomba (2021).

Table 1: Summary Statistic

	LNMAF	FDI	LNLF
Mean	13.32560	1.574506	3.968228
Median	13.55138	1.266578	3.971555
Maximum	16.33768	5.790847	3.981292
Minimum	10.19936	0.257422	3.948878
Std. Dev.	2.001101	1.242661	0.010639
Skewness	-0.187167	1.701897	-0.524455
Kurtosis	1.737884	5.930854	1.861397
Jarque-Bera	2.744015	31.94488	3.794666
Probability	0.253597	0.000000	0.149968
Sum	506.3729	59.83123	150.7927
Sum Sq. Dev.	148.1630	57.13565	0.004188
Observations	38	38	38

Source: Author Computation

Table 2: Correlation Matrix

Observations	LNMAF	FDI	LNLF
LNMAF	1.000000		
t-Stat	-----		
P-value	-----		
No.Obs			
FDI	0.111880	1.000000	
t-Stat	0.675522	-----	
P-value	0.5037	-----	
No.Obs			
LNLF	0.778429	0.063134	1.000000
t-Stat	7.440378	0.379560	-----
P-value	0.0000	0.7065	-----
No.Obs	38	38	38

Source: Author Computation

Table 3: Unit root test results.

	PP		ADF	
Variables	**Level**	**First Difference**	**Level**	**First Difference**
lnGDP	-1.7358 (0.7149)	-4.5471*** (0.004)	-1.6981 (0.7314)	-4.5272*** (0.004)
lnFDI	-3.8208 (0.006)***		-3.8982*** (0.004)	
LnLF	-2.0650 (0.5476)	-2.5440** (0.012)	-1.0093 (0.9281)	-5.1202*** (0.000)

Source: Author computation

3.1. Cointegration Approach

A cointegration estimation is necessary because it determine the long run relationship between the variable of interest. It could be carried out through many processes such as the Johanson cointegration test or ARDL bound test. This study leveraged on the ARDL bound test to cointegration and the result proved that there is cointegration in the economy as indicated by the F-statistic and the upper bound values. In essence, the F-statistic of 6.9 is greater than all the upper bound values 4.02 (10%), 4.61 (5), 5.16 (2.5%) and 5.85 (1%). Thus, we conclude that there is a long run equilibrium relationship between the variables under investigation.

Table 4: .ARDL Bound Test

Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	6.9154	10%	3.38	4.02
K	2	5%	3.88	4.61
		2.5%	4.37	5.16
		1%	4.99	5.85

Source: Author computation from Eviews 10

Haven confirmed the equilibrium position of the variables, the study went further to examine the empirical relationship between the variables of the model through the dynamic ARDL approach. The result indicates that capital (FDI inflow) exerts positive and insignificant impact on the manufacturing sector in the short run which turn out to be positive and significant in the long run. This validated the work of Afamefuna Angus, Nnaji and Nkalu (2019), Anowor, Ukweni, Ibiam and Ezekwem (2013), Idoko and Taiga (2018) for Nigeria, but invalidated Adejumo (2013). Precisely, a 1% increase in capital (FDI inflow) will lead to a 1.75% increase in the output of the manufacturing sector in the short run, and a 14.9% increase in the manufacturing sector output in the long run. Similarly, the result shows that the impact of labour is negative and insignificant in the short run, but positive and insignificant in the long run. A 1% increase in labour will revert growth in the output of the manufacturing sector by 114% in the short run which is elastic. While, in the long run, a 1% increase in the labour will promote the productivity of the manufacturing sector by 107% which is also elastic as well. This means that the manufacturing sector is more responsive to changes in labour than capital inflow.

Comparatively, the result shows that capital inflow drives the output of the manufacturing sector significantly compared to labour. In essence, the manufacturing sector in Nigeria is capital-driven. This, requires that more capital should be allocated to the sector for optimum return of output which can be achieved in part by wooing more FDI inflow into the economy. The inefficiency of labour (human capital) demonstrated in this study seems to be connected with the poor level of human capital development that characterized the third world countries. The above outcome is validated by the result from the causality test which proved that capital inflow is a predictor of growth in the output of the manufacturing sector in Nigeria, while labour is not. Further result proved that FDI inflow and manufacturing sector are predictors of the labour. This validates the empirical assertion that FDI inflow could take the form of human capital development into the recipient country. Finally, the ECT which shows the speed of adjustment (ECT – 0.8738) of the variables is presented in Table 5. The result proved that the speed of adjustment is 87% which is very speedy. In essence, any disturbances in the economy in the short run will be equilibrated in the long run within short possible time.

Table 5: ARDL Result RMAF=f(FDI, LF)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Short Run				
LNFDI	0.017525	0.014165	1.237225	0.2511
LNLF	-14.03850	49.42905	-0.284013	0.7836
ECT	-0.873868	0.141695	-6.167232	0.0003
Long Run				
LNFDI	0.149111	0.049893	2.988624	0.0174
LNLF	7.057134	24.55563	0.287394	0.7811

Source: Author Computation Eviews version 10.0 case IV Peseran et al. (2001)

Table 6: Granger Causality Test

| Null Hypothesis:	Obs	F-Statistic	Prob.
FDI does not Granger Cause LNMAF	37	4.50088**	0.0412
LNMAF does not Granger Cause FDI		0.01502	0.9032
LNWF does not Granger Cause LNMAF	37	2.56617	0.1184
LNMAFdoes not Granger Cause LNLF		5.34197**	0.0270
LNWF does not Granger Cause FDI	37	0.06307	0.8032
FDI does not Granger Cause LNLF		6.73092**	0.0139

Source: Author Computation

Table 7 below presented the result from the sensitive test which help in determining the robustness of the empirical model. This is necessary for reliability of the model for policy formulation. The outcome proved that we reject all the hypothesis, thus, we conclude that the model of the current study is free from the problems of serial correlation, heteroscedasticity problem and is normally distribution. Similarly, the cumulative sum (CUSUM) and cumulative sum of square (CUSUMsq) of recursive residuals plots represents the stability and reliability tests as indicated in figure 1. Since the Blue lines of the two plots fall within the critical point we conclude that the current model is stable and reliable for policy direction and guide as supported by Joshua et al. (2020).

Table 7: Diagnostic Tests

Tests	F-statistic	P. Value
$\chi 2$ **NORMALITY**	1.2187	0.5436
$\chi 2$ **SERIAL**	2.5683	0.1564
$\chi 2$ **WHITE**	2.3463	0.1109
$\chi 2$ **RAMSEY**	2.5116	0.1223

Source: Author computation.
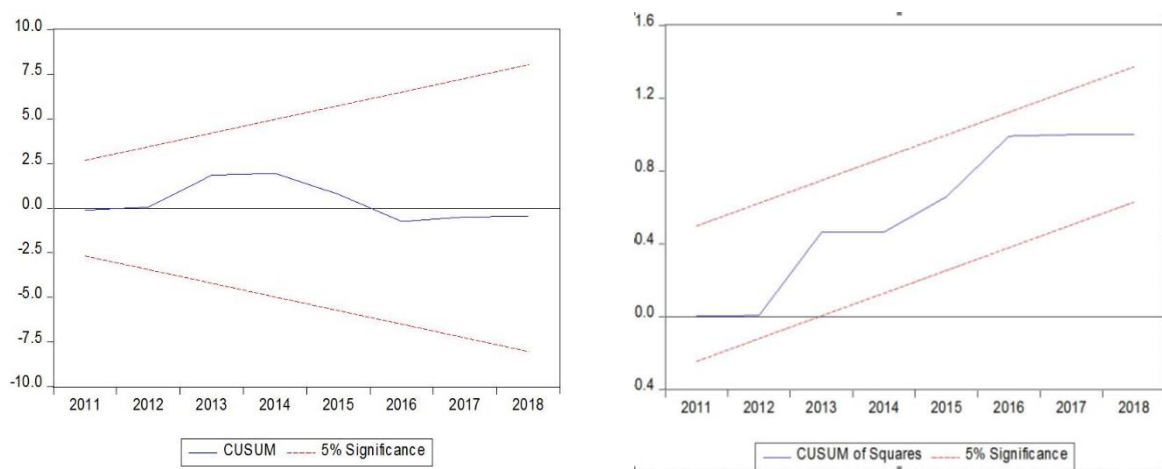
Figure 1: Graphical plots for CUSUM and CUSUM-Square stability test.

4. CONCLUSION AND POLICY RECOMMENDATION

Capital and labour are the two traditional factors of production in any given economy. Thus, this study set out to examine the impact of these traditional factors on economic growth via the manufacturing sector performance in Nigeria to ascertain which of the two exerts more impact on output growth. The result proved that the output of the manufacturing sector is positively and significantly promoted by the capital (FDI inflow) compare to labour. Although the manufacturing sector output is highly responsive to the changes in labour, the impact of labour on output is positive but insignificant. This proved that the manufacturing sector in Nigeria is a capital-driven sector rather than labour-intensive.

Inview of the above, the study recommends the need to attracting more of capital inflow (FDI inflow) into the manufacturing sector as an attempt to promoting the productivity of the sector. The authority concern should as a matter of concern device incentives such as stable exchange rate, tax holidays peaceful political environment and stable macroeconomic environment which will help in attracting foreign investors into the manufacturing sector of the country. This will in turn promote the growth rate of output in the same sector, thereby, influence the economic fortune of the country at large. This is instructive to the policy maker and the stakeholders in general.

Similarly, the insignificant impact of labour on the output of the sector could be linked to poor human capital development which is a common characteristic of the developing countries like Nigeria. This call for an overhaul of the existing education and technical training system in the country. Effort must be put in place by both government and private organizations to improve standard of education in the country to meet up with the global minimum threshold to enhance the general efficiency and performance of labour in the economy which will trickle down to manufacturing sector.

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