

# Foreign Direct Investment and Performance of Manufacturing Sector in Nigeria: any Link to Agricultural Production?

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## Abstract

There has been lack of consensus regarding growth effect of Foreign Direct Investment (FDI) on host communities. For this reason, current research efforts now focus investigation on the impact of FDI on the manufacturing sector, being the sector with potential for harnessing the benefits of foreign investment. As a result, this study examined the impact of FDI on manufacturing sector performance, and subsequently traced the effect of this on agricultural production. Solow augmented growth model served as base for analysis while Autoregressive Distributed lag (ARDL) model was utilized in estimation. Findings show no support for any significant relationship between FDI and manufacturing sector performance, but a strong positive correlation exists between manufacturing output and agricultural production. On the bases of this, the study concludes with a research agenda; future investigation on the subject should focus on links among domestic firms, manufacturing sector performance and agricultural production.

**Keywords:** FDI, Manufacturing output performance, Agricultural production, Solow growth model, ARDL model, Nigeria.

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## INTRODUCTION

Arguments have been raised regarding the role of foreign direct investment (FDI) in growth and development of host communities. This is a fall-out of the contention and general believe that FDI can help stimulate growth through positive spillover effects. Need for evidence-based argument on the matter led scholars into the examination of the spillover hypothesis in different contexts. The results of these investigations were diverse. While some studies found support for positive spillover hypothesis [1, 2], others do not [3, 4]. However, it is argued that often referenced benefits such as technology transfer and management know-how, introduction of new processes, and employee training relate more to the manufacturing sector than the agricultural or mining sectors [5]. Therefore economy-wide effect of FDI on host communities is through its effect on manufacturing sector. Hence, it is expected that the impact of FDI on the manufacturing sector is transmitted widely to other sectors through broad linkage effects. This study as a result, examined the impact of FDI on output performances of the manufacturing sector, and subsequently and analytically traced the effects of this impact on agricultural production in Nigeria.

Statistically, evidence points to an upward increases in the flow of inward FDI within the period under examination. For instance, on the basis of ten period averages, there has been a progressive increase in the flow of inward FDI in Nigeria; from \$9572.64 million dollars annual worth of investment over the period 1986 – 1995, inward FDI increased to an average value of \$24528.84 million per annum over the period 1996 – 2005, and \$72688.35 million over 2006 – 2015. These increases however did not translate to corresponding increase in manufacturing value added as a percentage of GDP. Manufacturing value added as a percentage of GDP over same period decreased instead from 6.52% in 1986 – 1995 to 4.05% over the period 1996 – 2005, but increased subsequently to 5.99% per annum over the period 2006-2015. Specifically, the aggregate decreased steadily (on average) from 9.5% in 1986 to 2.4% in 2008 but increased subsequently to 9.5% in 2015 but 8.8% in 2016.

Examination of past research efforts in this line of investigation indicates that a good number of Nigerian specific studies actually did focus investigation on the impact of FDI on the manufacturing sector [6-12]. However, these studies are limited by the fact that none considered the second-round effect of the impact of FDI on the manufacturing sector performance, neither did any specifically consider the linkage effect of this on agricultural production in particular. This explains the gap in literature addressed in this particular investigation. In this task, this study was guided by the

following objectives; (1) The determination of the impact of FDI on manufacturing sector output performance, (2) analysis of implications of this on agriculture production in Nigeria.

### **FDI, manufacturing output-performance and agricultural production**

It has been argued that FDI potential to create linkages to domestic firms necessary for growth stimulation within host economies could and indeed varies across sectors. This is the case since sectors have unequal potential to absorb foreign technology or to create linkages with the rest of the economy. While linkages are weak in the mining and agricultural sectors, manufacturing sector has great potential for linkages with the rest of the economy. This underscores the importance of manufacturing sector as a channel through which the impact of FDI can be transmitted to the rest of the economy through second-round effect. In this section of the study effort was made to examine possible evidence of statistical linkages among inward FDI, manufacturing output performance and agricultural production over the period for the study. See table I below.

**Table-1: FDI, Manufacturing performance and Agricultural production Relation**

Year	Inward FDI	Manufacturing output performance	Agricultural production
1986	12171.55	3654.55	65748.4
1990	13284.28	4434.03	84344.6
1995	13891.8	6026.18	96220.7
2000	13946.66	6716.63	117945.1
2005	15421.45	7483.66	231463.6
2010	15611.63	8182.74	324444.8
2015	14956.09	9102.06	452928.1

Source: CBN statistical bulletin various issues

From table 1, there seem to be a high degree of correlation between manufacturing output performance and agricultural production; both variables change in same direction and the magnitude of this change are not far apart. On the other hand, such correlation is lacking in the relationship between inward FDI and manufacturing output performance. Although both variables change in similar direction depicting a positive correlation, but such correlation appears to be weak. For instance, for three periods (1990, 1995 and 2000) inward FDI remained within thirteen thousand units, but manufacturing output increased by twenty points (from 44000 to 67000 units) over the same period. In summary, table 1 shows the prevalence of weak positive correlation between inward FDI and manufacturing output performance, but a strong positive correlation between manufacturing output and agricultural production.

## **EMPIRICAL LITERATURE**

Debate regarding the spillover hypothesis has been an age long debate. While some scholars argue that FDI generate positive spillover effects on growth [1, 13], some others argued that the effect is negative instead [14]. Subsequent analysis of the subject led Alfaro [5] into the conclusion that inward FDI presence in different sectors of the economy exerts different effects. While FDI inflows in the primary sector tend to exert negative effect, manufacturing FDI exerts positive effect; effect in the service sector according to the paper is ambiguous. On the other hand, Blomstrom and Kokko [15] argue that spillovers are not automatic, rather local conditions influence firms' adoption of foreign technology and skills.

The above arguments may as a matter of fact provide justification for mixed empirical findings. While some found positive effect on growth [16-25]. Some others found negative effect [26, 11, 9]. Among Nigerian studies that specifically examined the effect of FDI on the manufacturing sector, two found negative effect [27, 9], others found positive effect [22, 23]. On the other hand, Oloyede [24] examined the impact of FDI on the agriculture sector development and discovered a positive effect.

A summary of the empirical evidence as presented above both internationally and in the context of the Nigerian economy points to a general lack of consensus in findings. The situation is also not different among studies that focused on the manufacturing sector. This development means that more work need to be done to resolve the inconsistency. Secondly, no Nigerian study deemed it necessary to trace the effect of impact of FDI on manufacturing sector performance on the agricultural production through linkage effects. Further examination of the impact of FDI on manufacturing output performance and analysis of the second-round effect of FDI on agricultural production in the context of Nigeria, forms the main thrust of this particular investigation.

## METHODOLOGY

### Data, Theoretical framework and model specification

Time series data which span over the period 1986 – 2016 was used for the study. MOU is manufacturing output - proxy for manufacturing sector performance, FDI represents inward flow of foreign direct investment, GfCAP is gross fixed capital formation - proxy for physical capital, LABF is labour force - proxy for human capital, while EXR represents exchange rate used as proxy for openness of the economy. Annual data for the variables were sourced from the World Bank database for the year 2017.

The study adopted the Solow's augmented growth model as bases for analysis of the relationship between FDI and manufacturing output performances. The model proposes that output growth is a function of physical capital accumulation, expansion in the level of labour (human capital) as well as technological progress which is exogenously determined. In this context productivity of physical capital and labour are enhanced by technological progress. Thus,

$$Y = f(A, K, L) \quad \text{--- (1)}$$

Where Y is aggregate output, K is stock of physical capital, L is stock of labour (human capital), and A is the efficiency factor. Furthermore, equation (1) is expanded by introduction of exchange rate (EXR) as proxy for openness of the Nigerian economy. As a result, equation 1 is transformed to:

$$Y_t = A(K_t L_t EXR_t) \quad \text{---- (2)}$$

Where EXR is the bilateral exchange rate of the naira vis -avis the United States' dollar, "t" is time subscript.. The specific empirical relationship is specified as:

$$\log MOU_t = \beta_0 + \beta_1 \log GfCAP_t + \beta_2 \log LABF + \beta_3 \log FDI_t + \beta_4 \log EXR_t + \mu_t \quad \text{----(3)}$$

Where log is logarithmic notation, and  $\mu$  is the error term; other variables are as already defined. A priori expectation is  $\beta_1, \beta_2, \beta_3, \beta_4 > 0$

## RESULTS AND DISCUSSION

Macroeconomic variables by nature are known to exhibit random-walk behaviour. As a result, stationarity properties of the variables were examined using Augmented Dickey-Fuller (ADF) stationarity test (see table 2 below).

**Table-2: Results of Stationarity Tests**

Variables	ADF Statistics	1% Critical Value	5% Critical Value	Order of Integration
LogMOU	-3.869911	-3.679322	-2.967767	I(1)
LogLABF	-5.068406	-3.679322	-2.967767	I(1)
LogGfCAP	-3.743882	-3.670170	-2.963972	I(0)
LogFDI	-9.152011	-3.679322	-2.967767	I(1)
LogEXR	-5.454901	-3.679322	-2.967767	I(1)

Result of stationarity tests on each of the macroeconomic variables show that all but GfCAP are integrated of order one (I(1)); GfCAP is integrated of order zero (I(0)). This outcome in the order of integration among the variables necessitated the choice of Autoregressive distributed lag (ARDL) bound test technique of estimation in the analysis as was proposed by Pesaran, Shin, and Smith [28]. The bound test approach has the unique feature of examining both long run and short run impact in a given model. This as it relates to the study is presented in table 3 and 4 respectively

**Table-3: Result of Long Run Regression**

Dependent Variable	Independent Variables	Coefficients	t-Statistics	P-values
Log MOU	-	-	-	-
	C	-35.189805	-4.224591	0.0005
	LogLABF	2.096194	4.078091	0.0007
	LogGfCAP	2.092667	5.998679	0.0000
	LogFDI	0.053533	0.820888	0.4224
	LogEXR	0.110301	1.826486	0.0844

An examination of table 3 above shows that all variables conformed to the theoretical expectations - all has positive coefficients. Positive coefficients indicate tendency for increase in manufactory output given increase in any of the explanatory variables. However among these variables (explanatory variables), only labour force (LABF) and gross

fixed capital (GfCAP) are significant in accounting for any observed changes in manufacturing output performance (MOU). The main variable of interest (FDI) and exchange rate (EXR) are statistically insignificant in accounting for observed changes in MOU given probability values of 0.4224 and 0.0844 respectively. The specific empirical relationship between each of the variables found to be significantly related to MOU shows tendency for MOU to increase by 209.6% given 1% increase in LABF. On the other hand, 1% increase in GfCAP increase MOU by 209.3%; this indicates a relatively equal magnitude in impact. Table 4 presents the short run dynamics of this relation.

**Table-4: Result of Dynamic Short Run Regression**

Variables	Coefficients	t-Statistics	P-values
C	-22.71710	-2.863587	0.0103
LogLABF	10.92173	2.525372	0.0212
LogLABF(-2)	8.531183	-2.264622	0.0361
LogGfCAP	-0.661346	-1.460498	0.1614
LogGfCAP(-1)	1.211952	2.378214	0.0287
LogFDI	-0.031451	-0.875232	0.3930
LogEXR	0.071190	1.713463	0.1038
Cointeq(-1)	-0.645417	-4.745003	0.0002
F-statistics	1305.748		0.0000
R <sup>2</sup>	0.99		
Adj R <sup>2</sup>	0.99		

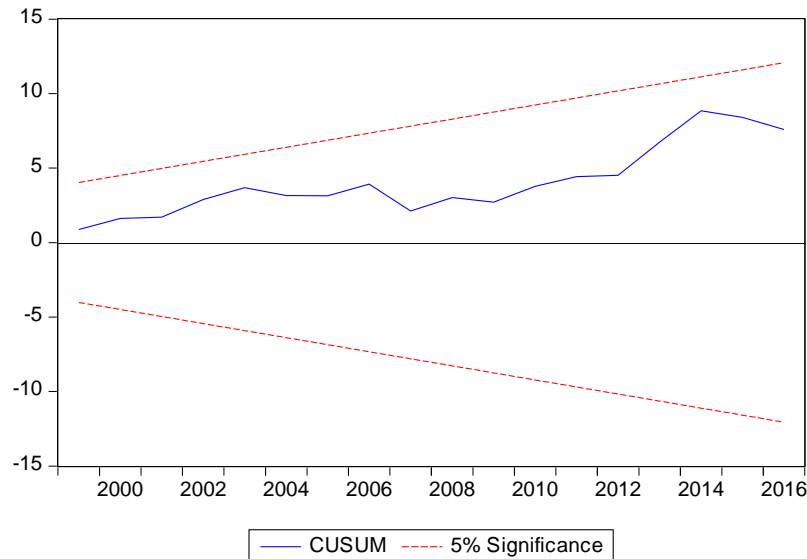
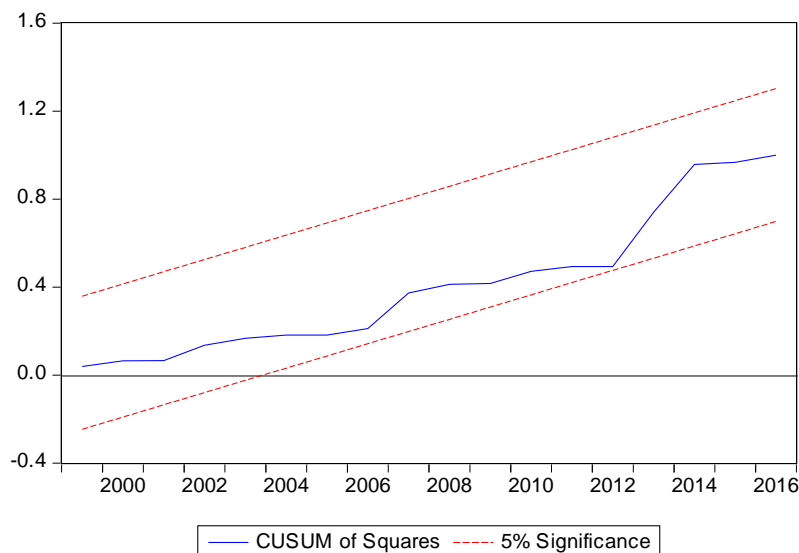
The specific short run dynamics of the relationship between MOU and each of the explanatory variables shows that at the immediate, 1% increase in LABF significantly increases MOU by 1092.2%, but gives rise to a significant reducing effect after two periods; after two periods, MOU reduces by 853.1%. On the other hand, significant impact of GfCAP on MOU is felt after one period. At this period, MOU increases by 121.2% for every 1% increase in GfCAP. Both FDI and EXR remained statistically insignificant across periods. The model has a R<sup>2</sup> of 0.99 which implies that 99% of change in MOU is actually explained by the set of explanatory variables. F statistics value of 1305.748 with a probability value of 0.0000 indicates that the entire regression model is significant. Given error correction term (Cointeq(-1)) of -0.645417 means that on the event of disequilibrium, there is adjustment to equilibrium at the rate of 64.5% in every period, and it is rightly signed.

### Diagnostics Tests

Results of all the diagnostics tests conducted indicate failure to reject the null hypothesis in each case (see table 5 below). In this case, the Breusch-Godfrey serial correlation LM test, Breusch-Pagan-Godfrey test of heteroscedasticity, Jarque Bera test of normality as well as the Ramsey RESET test for possible specification bias - all show failure to reject the null hypothesis. This means that there is no serial correlation, neither is there any case of violation of the assumption of constant variance; the model is well specified and normally distributed. Also, results of both the CUSUM and CUSUM of squares test show that parameters of the aggression model are stable across periods (see figure 1a and 1b below).

**Table-5: Results of Diagnostics Tests**

Test	Statistics	P-value
Jarque-Bera	1.973631	0.372762
Breusch-Pagan-Godfrey	0.445393	0.9037
Breusch-Godfrey LM	0.078955	0.9244
Ramsey RESET	3.096019	0.0965

**Fig-1a: CUSUM Plot****Fig-1b: CUSUM of SQUARES Plot**

## SUMMARY AND CONCLUSION

This investigation was embarked on to determine the impact of FDI on manufacturing output performance, and subsequently trace its effect on agricultural production. To achieve this objective, both statistical and empirical analyses were conducted on the set of data for the variables of interest. Outcome of these indicate absence of significant relationship between FDI and manufacturing output performance, but a strong positive correlation between manufacturing output performance and agricultural production as judged by the statistical examination of the behaviour of the variables. Specifically, activities in the manufacturing sector are not majorly driven by presence of multinational firms given minimal presence of manufacturing FDI in Nigeria. On the contrary, manufacturing activity in Nigeria seems to be dominated by domestic firms which engage mainly in processing of agricultural products. Therefore, rather than impact of foreign firms it is more likely that, significant impact of domestic firms could be that which is transmitted instead, through broad linkages between the manufacturing and agricultural sectors, hence the result herein. On the bases of this, the study makes a case for future research efforts on this socioeconomic issue to focus examination on the links among domestic firms, manufacturing sector performances, and agricultural productions.

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