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RESEARCH ARTICLE

THE CAUSAL LINK BETWEEN FOREIGN DIRECT INVESTMENT, EXPORT AND ECONOMIC GROWTH IN NIGERIA: AN APPLICATION OF GRANGER CAUSALITY

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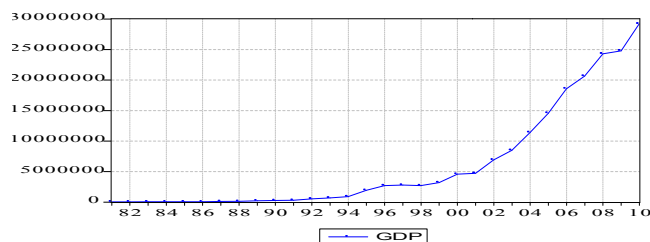
ABSTRACT

This study examined the nature of causality, the impact and relationship between foreign direct investment (FDI), export, and economic growth in Nigeria. Granger causality analysis was used to test the hypotheses causal link between foreign direct investment and economic growth; export and economic growth, while, correlation analysis and Ordinary Least Square (OLS) were used to determine the relationship and the significant effect of FDI and export on economic growth. Our data were extracted from Central Bank of Nigeria (CBN) for a period of 29 years (1981-2010) both years inclusive. After testing for stationarity of the time series, the study revealed no directional-causality relationship between FDI and GDP as well as export and GDP. However, there are evidence of positive relationship between FDI, export and GDP as well as a significant effect of export on GDP. Given the lack of non-directional causality between FDI, export and GDP, Nigerian government should encourage domestic investments through prudent fiscal and monetary policies geared towards achieving economic growth that will attract FDI and encourage exports.

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INTRODUCTION

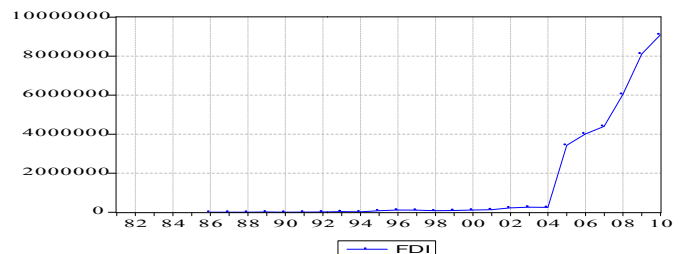
The results of studies carried out on the linkage between FDI, export and economic growth in Nigeria are not unanimous in their finding. The country has witnessed high inflow of FDI as a result of investment in the services sector. The oil sector of the economy has also witnessed an increased level of FDI as evidenced by the increasing numbers and operations of oil multinational corporations in the country yet there have been a lot of controversies in the country over the effectiveness of foreign investments in stimulating the rate of economic growth and export (Adofu, 2010). Figure 1 illustrates trends of GDP at constant basic prices in Nigeria, for the tested period 1981 – 2010. During the eighties, the GDP grew from 47,619.66 million in 1981 to 216,797.54 million in 1989. The early eighties are characterised by a stagnated trend until 1986.



Source: CBN 2011 Statistical Bulletin

Fig. 1. Nigeria's GDP at Current Basic Prices. (1981-2010)

However, since 1986 a relatively stable upward trend with small sub-period adjustments is recorded until 2001. The pace of the increase in GDP per capita was sharply accelerated during the last decade, reaching from 4,582,127.29 trillion naira in 2000 to 29,205,782.96 trillion naira in 2010, which is also the highest pick recorded for GDP in the economic history of Nigeria. Initially, foreign investment had no free flow in Nigeria due to its restrictions to only few areas in the early 1980's. However, since 1986 the services and industrial sectors opened for foreign capital penetration resulting to a higher level of FDI flows afterwards as shown in Fig 2.



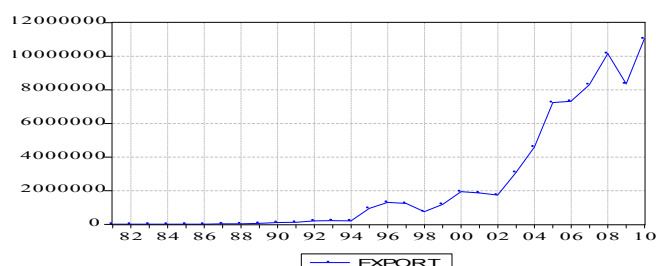
Source: CBN 2011 Statistical Bulletin

Fig. 2. FDI in Nigeria (1981-2010)

The data on FDI inflows into Nigeria are given in Fig 1 above. FDI data actually was recorded first in 1986 with an inflow of 735.8 million naira. During the period from 1986 to 1990, the value was very low and it ranges from 735.8 million naira to 4,686.20 million naira less than 5 Billion naira. The average value of FDI inflows in this decade works out to 23,470.20 million naira. During the period from 1990 to 2000, the FDI

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inflows into Nigeria had grown considerably. The value of FDI Inflows has increased from 4,686.20 million naira in 1990 to 115,952.20 billion naira in 2000. The average value of FDI inflows in this decade works out to 66,044.60 billion naira. In the next decade, the value of FDI inflows increased to the highest of 36 trillion naira in 2010 averaging 3.6 billion naira. It is expected that FDI will enhance export.



Source: CBN 2011 Statistical Bulletin

**Fig. 3. Nigeria's Total Export (1981-2010)**

The Exports in Nigeria was 11,023.30 million naira while falling to 7,502.50 million naira in 1983 but rising to 11,720.80 million naira in 1985 and has continued growing afterwards. In 1990, Nigerian export hit 109,886.10 billion naira, 1.3 trillion naira in 1996, 1.9 trillion in 2000 and 11 trillion naira in 2010. The above graphical representation of export and FDI shows steady improvement and should translate to economic growth. FDI and export has been acknowledged as a major propellant of growth through transfer of technology, technological innovations and other externalities. Empirical results show conflicting relationships and influences between economic growth (GDP) and FDI contrary to the belief of authorities in charge of growth and development. Relationships between foreign direct investment (FDI), export and economic growth have been a recurring subject of debate. Studies on this topic however have coinciding evidences. Consequently, this paper tends to move from the past studies on the relationship and/or effect of foreign direct investment, export, and economic growth to ascertain the causal relationship between foreign direct investment, export, and economic growth. The objective of this study therefore, is to apply an integrated data to examine the directional causal link between Foreign Direct Investment (FDI), export and economic growth in Nigeria beyond relationship and impacts. The rest of this study is organized as follows: section 2 reviews the literature; section 3 discusses the methodology; section 4 presents the findings and section 5 concludes the study with recommendations.

### Review of Related Literature

According to the proponents of Foreign Direct Investment, the higher amount of foreign investment a country can attract the higher portion it can take from global production and income, therefore its national wealth can increase (Ogundipe *et al* 2011, citing Guraks, 2003). The available empirical studies on the impact of foreign direct investment (FDI) on growth provides contrasting results not only about the existence of a significant link between foreign direct investment and growth rate of the recipient country, but also about the signs of such relationship. For instance Omoniyi *et al* (2011) BornSchiev (1978) and Dutt (1997) show that growth rates are negatively related to foreign capital stocks but turns out to be positive (Omoniyi and Omobitan 2011). Blomstorm *et al* in 1992

found a significant positive impact of FDI inflows on growth but Hein in 1992 found no significant relationship (Omoniyi and Omobitan, 2011). Past studies on foreign direct investment, export, and economic growth such as Adofu, (2010) revealed that though there was a positive relationship between FDI and economic growth, the relationship was however found to be statistically insignificant. Folorunsho (2009) found out that FDI has not contributed significantly to output growth in Nigeria. Foreign Direct Investment however has been found to exert some level of influence on exports of goods and services. Sikiru (2012) examined the relationship among the exports, FDI and economic growth in Nigeria over the period 1960-2009 and found that FDI, capital formation, degree of openness, import and terms of trade played a significant role in the economy along side with other variables. The paper concludes by shedding more light on the relevance of degree of openness that can facilitate more FDI inflows capable of accelerating the growth process. Ogunmuyiwa *et-al* (2011) indicates that FDI contributes positively to Nigeria's economic growth despite the structural change in the flow of FDI in the economy. Oyatoye, Arogundade, Adebisi, Oluwakayode, (2011) concludes that direct foreign investment has positive impact on the Nigerian economic growth by increasing the level of export (EXP) and Gross Domestic Product (GDP). Therefore, government should encourage steady flow of FDI so as to enhance export and hence improve the national GDP for a better economic growth. FDI in Nigeria induces the nations' economic growth. Although, the overall effects of FDI on the whole economy may not be significant, the components of FDI positively affect economic growth and therefore FDI needs to be encouraged (Adeola, 2011).

Studies on the directional causality links between foreign direct investment, export, and economic growth have been few with causal link coinciding results. In Nigeria, Umoh, Jacob and Chukwu (2012) found a bi-directional relationship between economic growth and FDI inflows to Nigeria. Thus, as FDI encourages growth, more growth also encourages more FDI, hence there is a kind of positive feedback relationship between FDI and economic growth in Nigeria. Erhieyovwel and Jimoh (2012) studied foreign direct investment Granger and Nigerian growth and found that economic growth (GDP) does not granger cause Foreign Direct Investment (FDI) in Nigeria. In Greece, Georgantopoulos and Tsamis (2011) studied the Causal Links between FDI and Economic Development in Greece and found Granger causality test indicates that there is no bi-directional causal links on the FDI – GDP relationship but, a unidirectional causality running from GDP to FDI, as results for the one and two year lags imply, strongly indicating that foreign capital penetration Granger-causes economic growth in Greece. Jayachandran and Seilan (2010) studied the causal relationship between trade, FDI and economic growth for India. The Granger causality test done by using annual data from 1970 to 2007 in India reveal a causality relationship from FDI inflows to exports, that there is no causality relationship from economic growth to exports, and that there is no causality relationship from economic growth to FDI in India. Again, Georgantopoulos and Tsamis (2011) investigated the causal links between economic development, foreign capital penetration and foreign trade for a European Union candidate country, Turkey, during the period 1970 – 2009. The Granger Causality test results

using Vector Auto Regression (VAR) estimates and the Error Correction Model imply that there is no dynamic two – way causal link between GDP per capita, FDI flows and Exports for Turkey. However, results indicate unidirectional causalities running from FDI to GDP, exports to GDP and Exports to FDI. Reza and Moijataba (2011) examines the Granger causality relations among GDP, exports and FDI in Middle East and North Africa counties (MENA) and their Granger causality tests indicate that there are bidirectional causality relations among all three variables for this group of sample. Rudra (2009) examined relationship between foreign direct investment (FDI) and economic growth in the five ASEAN countries namely, Indonesia, Malaysia, Philippines, Singapore and Thailand over the period 1970-2007 and the Granger causality test further evidenced that there is bidirectional causality between foreign direct investment and economic growth both at the panel level as well as individual country level except Malaysia. Given the above, there is no consensus between the causal links among FDI, export and economic growth and hence this study to contribute to knowledge between the variables.

**METHODOLOGY**

This study made use of time series data sourced majorly from the Central Bank of Nigeria (CBN) statistical bulletin. The study covered a period of 29 years (1981-2010). Following previous studies, to measure economic growth, Gross Domestic Product (GDP) was adopted for this study because it is the most reliable indicator of measuring economic growth in developing countries (Oyatoye et al, 2011). The GDP adopted was denominated in Nigerian currency at basic constant prices. FDI is net inflows of investment to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor Georgantopoulos and Tsamis (2011). It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the CBN statistical bulletin. Export as used in this study represents the quantities and values of goods that move out of a country. The analyses were carried out in four stages. First, we deflated the effect of scale effect of numbers by taking the natural log of the time series data. Secondly, we ascertained the properties of our time series data to ensure that there is no unit root problem using the ADF unit root test. A time series is considered to be stationary if its mean and variance are independent of time. If the time series is non-stationary, that is, having a mean and or variance changing over time, it is said to have a unit root (Johannes et al, 2011). Stationarity is important in econometrics as most time series data exhibit unit root problem. If a time series is non-stationary, the regression analysis carried out in a conventional way will produce spurious results. A non-stationary time series can be converted into a stationary time series by differencing (Johannes et al, 2011). The Unit Root Test is based on the following regression form with intercept:

$$\Delta Y_t = \alpha + \delta Y_{t-1} + u_t$$

The hypothesis is:

$$H_0: \delta = 0 \text{ (Unit Root)}$$

$$H_1: \delta \neq 0$$

Decision rule:

If  $t^* > PP$  critical value,  $\implies$  not reject null hypothesis, i.e., unit root exists.

If  $t^* < PP$  critical value,  $\implies$  reject null hypothesis, i.e., unit root does not exist.

Thirdly, we ascertained the bidirectional causal relationship between economic growth, FDI and export by applying Granger causality test. To ascertain the bivariate directional causal link between our focal variables GDP, FDI and export we applied a dynamic time series data model for examining the causal link between FDI, export and economic growth as follows.

$$GDP_{it} = \alpha \sum MFDI_{it} + c \dots\dots\dots (3)$$

$$FDI_{it} = \alpha \sum GDP_{it} + c \dots\dots\dots (2)$$

$$GDP_{it} = \alpha \sum EXP_{it} + c \dots\dots\dots (3)$$

$$EXP_{it} = \alpha \sum GDP_{it} + c \dots\dots\dots (4)$$

Granger causality test was applied to determine if Foreign Direct Investment and export actually Granger causes economic growth in Nigeria or the economic growth granger causes FDI and export.

Thus we hypothesize as follows:

$$H_{01}: \text{NLFDI does not Granger cause NLGDP}$$

$$H_{02}: \text{NLEXP does not Granger cause NLGDP}$$

The decision rule is to accept the null hypothesis where the probability of F-statistics  $< 0.05$  otherwise reject the null hypothesis. Fourthly, we ascertained the relationships and/or impact of FDI and export on Nigerian economic growth using the OLS. Our OLS model is a modification of a simple ordinary least square (OLS) as applied by Oloyede and Obamuyi (2000), and Oyatoye *et al* (2011) who opined that Direct Foreign Investment and export are inevitable in the economic growth of a nation.

The model is stated thus:

$$nlGDP = f(nlFDI + nlEXP) + U_1 \dots\dots\dots (5)$$

Where GDP = Gross Domestic Product

FDI = Foreign Direct Investment

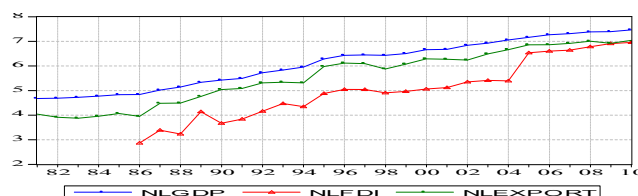
EXP = Export

FNDP = Foreign Debt

$U_1, U_2$  = Stochastic error term.

**Findings**

To guard against spurious econometric results, analysis and conclusion, this study took caution by checking the properties of the time series data. To get a rough idea if our time series are stationary or not, we plotted the series in a line graph as represented below:



Source: Authors' Eviews3.1 output

**Fig 4. Graphical Representation of the Time Series Data**

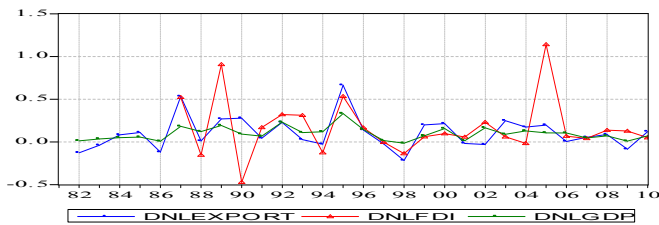
The time series seems as a non-stationary data since it increased upward as time changes suggesting that they have a mean and or variance changing over time and hence the application of the Philips-Perron differencing approach to make the time series data stationary. The Philips-Perron unit root tests are presented below.

Table 1: Philips-Perron Unit Root Test

Variables	1% Critical value* @ level	PP Test statistic @ level	Status	1% Critical value* @	PP Test Statistic (t*)
nIGDP	-3.6752	-0.366930	1 <sup>st</sup> difference	-3.6852	-4.434664
nIFDI	-3.7343	-0.883569	1 <sup>st</sup> difference	-3.7497	-7.780783
nIExport	-3.6752	-0.486208	1 <sup>st</sup> difference	-3.6852	-6.383621

Source: Author's Eview 3.1 output.

The above table reports that none of the time series were stationary at level as their PP test statistic at level > the 10%, 5% and 1% critical value at level indicating a unit root at level. However, the non-stationary time series were converted into stationary time series by differencing at 1<sup>st</sup> difference only. Given that their PP test statistic at 1<sup>st</sup> difference < critical values at 10%, 5% and 1%, we therefore conclude that there is no unit root with the time series; that, the time series data are integrated at 1<sup>st</sup> difference. We also double checked the above conclusion by plotting the line graph of the 1st-difference of DnIGDP, DnIFDI and DnIExport.



Source: Authors' Eviews Output

Fig. 5. Graphical Representation of Differenced Time Series.

A comparison of the above with Fig. 4 shows the time series now has a constant mean and constant variance which implies the first difference series of "nIGDP, nIFDI and nIExport" achieves stationarity and hence, further analysis.

**GRANGER CAUSALITY RESULT**

The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another (Wikipedia, 2012 citing Granger, 1969). Ordinarily, regressions reflect "mere" correlations, but Granger argued that there is an interpretation of a set of tests as revealing something about causality. A time series X is said to Granger-cause Y if it can be shown, usually through a series of t-tests and F-tests on lagged values of X (and with lagged values of Y also included), that those X values provide statistically significant information about future values of Y and hence our Granger causality result below.

Table 2: Granger Causality Test Result

Sample: 1981 2010			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Probability
DNEXPORT does not Granger Cause DNLGDP	28	0.57063	0.45707
DNLGDP does not Granger Cause DNEXPORT		2.74309	0.11018
DNLFDI does not Granger Cause DNLGDP	23	0.21087	0.65103
DNLGDP does not Granger Cause DNLFDI		1.37029	0.25552
DNLFDI does not Granger Cause DNEXPORT	23	0.13576	0.71641
DNEXPORT does not Granger Cause DNLFDI		0.06377	0.80321

Source: Authors E view calculations.

The Granger causality test consists of rejecting the null hypothesis of no causality when the probability of the F-Statistics is less than 5%.0.05.

The Granger Causality results indicate that there exists no causal link between FDI and GDP, and Export and GDP. The null hypotheses that FDI and export does not Granger Cause economic growth in Nigeria are accepted as the probability of F-Statistics of 0.45 and 0.65 for export and FDI > 0.05. Therefore, export and FDI does not cause Nigerian economic growth. This outcome tends not to support the works of Umoh, Jacob and Chukwu (2012) who found a bi-directional relationship between economic growth and FDI inflows to Nigeria and Georgantopoulos and Tsamis (2011) whose study indicates a unidirectional causality running from FDI to GDP, exports to GDP and Exports to FDI. However, our findings supports Erhieyovwe1 and Jimoh (2012) who found that economic growth (GDP) does not granger cause Foreign Direct Investment (FDI) in Nigeria; Georgantopoulos and Tsamis (2011) who found no bi-directional causal links on the FDI – GDP relationship in Greece; Jayachandran and Seilan (2010) who found no causality relationship from economic growth to exports; and that there is no causality relationship from economic growth to FDI in India.

Table 3: Correlation

Variables	DNLGDP	DNEXPORT	DNLFDI
DNLGDP	1.000000		
DNEXPORT	0.763383	1.000000	
DNLFDI	0.453900	0.423182	1.000000

Source: Author's Eview 3.1 output.

The correlation test result shows varying strength of degrees of positive relationships at 76% and 45% for FDI and Export respectively. Given the strong positive relationships between FDI, Export and GDP, the unbiased OLS result shows that they are statistically significant as shown in the Table below.

Table 4. Regression Result

Dependent Variable: DNLGDP				
Method: Least Squares				
Sample(adjusted): 1987 2010				
Included observations: 24 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DNEXPORT	0.281531	0.061343	4.589481	0.0002
DNLFDI	0.036540	0.034761	1.051164	0.3051
C	0.066899	0.012923	5.176628	0.0000
R-squared	0.603610	Mean dependent var		0.109404
Adjusted R-squared	0.565859	S.D. dependent var		0.077647
S.E. of regression	0.051161	Akaike info criterion		-2.991207
Sum squared resid	0.054967	Schwarz criterion		-2.843950
Log likelihood	38.89448	F-statistic		15.98908
Durbin-Watson stat	2.241113	Prob(F-statistic)		0.000060

Source: Author's Eview 3.1 output.

The table above depicts t-statistics of DNLFDI and DNEXPORT at 4.5894 and 1.0511 respectively. The result indicates that export has an impact on economic growth while strengthening the positive relationship between FDI and economic growth. The Adjusted R<sup>2</sup>, a more conservative value of the coefficient of multiple determinations indicates that 57% of the variations on GDP could be explained by the independent variables in our model. We therefore conclude that DNEXPORT has statistically significant effect on GDP. Our model is statistically significant as the Probability of the F-statistic of 0.00000 < 0.05 significant levels. It shows that these explanatory variables contribute positively to the

economic growth in Nigeria.  $DNLGDP = 0.281530702 * DNLEXPOR + 0.0365399119 * DNLFDI + 0.06689896875$ .

## Conclusion

This paper after ascertaining data stationarity applied Granger causality to empirically ascertain the causal relationship between FDI, Export and GDP. The Granger Causality results indicate that there exists no causal link between FDI and GDP, and Export and GDP. The null hypotheses that FDI and export does not Granger Cause economic growth in Nigeria are accepted as the probability of F-Statistics of 0.45 and 0.65 for export and FDI respectively  $> 0.05$ . Therefore, export and FDI does not cause Nigerian economic growth. We, therefore opine that it is a strong economic growth in Nigeria that attracts FDI and not the contrary view that FDI generates economic growth (GDP) in Nigeria. Given the findings of this paper, the Nigerian government is urged to encourage domestic investments in other to accelerate economic growth (GDP) which will attract FDI as well as promote export of goods and services. Also, Government should pursue prudent fiscal and monetary policies that will be geared towards achieving economic growth so as to encourage FDI as well as export.

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