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A Causal Nexus between Public Debt and Industrial Growth of Nigeria (1981-2017)

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ABSTRACT

This study empirically examined the causal relationship between public debt and industrial growth in Nigeria. It spanned from 1981 to 2017 and utilized annual time series secondary data extracted from the Central Bank of Nigeria (CBN) statistical bulletin (2017) edition. Ex-post facto research design was adopted while the Vector Autoregressive (VAR) method of Pair wise Granger Causality test was employed. Result of the study provided evidence that there is a unidirectional relationship running from public domestic debt to industrial growth in Nigeria; and no causal relationship between external debt and industrial growth in Nigeria. This implies that domestic debt plays an important role in the growth process of Nigerian economy. Based on these findings, it was recommended among others that the Federal Government of Nigeria should ensure economic and political stability in order to enjoy the benefits of domestic debt and make the debt burden minimal. The government should also as a matter of urgency begin the process of diversifying its economic base to avoid over reliance on borrowings to finance its deficits.

Keywords: Industrial growth, External debt, Domestic debt, Granger causality

INTRODUCTION

No government is an island on its own; it would require aid so as to perform efficiently and effectively. Governments borrow in principle to finance public goods that increase welfare and promote economic growth. However, it is expected that when these Less Developed Countries (LDCs) which are characterized by low capital formation due to low levels of domestic savings and investment are facing a scarcity of capital, they resort to borrowing from either internal or external sources so as to supplement their domestic saving [1]; [2]; [3].

External Debts are the portion of a country's debts that are borrowed from foreign lenders including commercial banks, governments or international financial institutions. External borrowing can be multilateral or bilateral. It is multilateral when it entails a country borrowing from international organizations like International Monetary Fund (IMF), International Bank for Reconstruction and Development (IBRD) aka World Bank, London Paris Club and other multilateral agencies. But when the borrowing involves a country like Nigeria borrowing from US government it is known as bilateral (government-to-government) debt [4].

The Economic theory suggests that reasonable levels of borrowing by a developing country are likely to enhance its economic growth [5]. In view of this, domestic debt in poor countries has been justified on the ground that it facilitates development of deep and liquid internal financial markets, protects countries from unfavourable external shocks and mitigates against foreign exchange risk.

The growth and development of Nigerian economy is largely dependent on the development of the manufacturing sector. Hence, the manufacturing sector can be referred to as the engine room for economic growth. It is the predominant factor for achieving macroeconomic goal of the economy. A review of this sector indicated that it has been performing below expectation over the period due partly to lack of long-term funds that is required to galvanize the sector in providing impetus for inclusive growth and job creation [6]. Some of these challenges as properly enumerated by [7], include: difficult and unfavorable operating environment due mainly to acute infrastructure deficiency in the nation, irregular supply of industrial fuels arising from epileptic operation of local refineries, high cost of alternative power supply to industries resulting in un-competitiveness of locally produced goods, lack of skilled middle-level manpower, high cost of fund and unavailability of long term loan windows to support long-gestation investment, perennial security challenges confronting the country particularly the increasing trend in terrorism, kidnapping and armed robbery, amongst others. However, this study is set out to investigate the causal nexus between public debt and industrial growth in Nigeria.

REVIEW OF EMPIRICAL LITERATURE

The study of [8] focused on the lessons and challenges in industrial development and growth in Nigeria. The authors employed descriptive statistics and revealed that the industrial sector accounts for 6 percent of economic activity while the manufacturing sector contributed only 4 percent to GDP in 2011. The result provided evidence that the primary sector, in particular, the oil and gas sector, dominates the gross domestic product accounting for over 95 percent of export earnings and about 85 per cent of government revenue between 2011 and 2012.

[9] empirically studied the possible existence of bi-directional causal relationships between public debt and economic growth in both central and peripheral countries of the European Economic and Monetary Union for the period of 1980-2013. The study utilized the bi-directional Granger-causality test mechanism considering heteroskedasticity test. The finding provided evidence of a “diabolic loop” between low economic growth and high public debt levels in Spain after 2009. For Belgium, Greece, Italy and the Netherlands debt was found to have negative effect over growth from an endogenously determined breakpoint and above a debt threshold ranging from 56% to 103% depending on the country.

The study of [10] focused on the causal nexus between public debt and economic growth in Nigeria from 1970 to 2010. The study employed Vector Autoregressive (VAR) analysis. The co-integration result showed that public debt and economic growth have long run relationship while the VAR estimate revealed that there is a bi-directional causality between public debt and economic growth in Nigeria.

[11] examined the impact of public debt, public investment and economic growth in Mexico. Dynamic Models of panel data and the Generalized Method of Moments with information for 32 states from 1993 to 2012, was used. The econometric results confirmed that public debt is positively correlated with public investment and that this in turn generates economic growth.

[12] examined the relationship between the structure of Nigeria public debts and the nation’s economic performance over the period 1990-2015.The study employ relevant data from CBN statistical bulletin of various issues and the analysis are based on two regression techniques simple and multiple. The simple regression result indicates significant positive relationship at 0.05 level between aggregate public debt and Nigeria GDP. Multiple regression analysis indicate that while the multiple correlation coefficient

is significant at 0.05 level, external debt in negatively signed while domestic debt signs positively with Nigeria's GDP.

[13] empirically examined the link between public infrastructure capital and industrial sector growth in Nigeria from 2000-2016. Ordinary Least Squares (OLS) regression and the Generalized Method of Moments (GMM) methods were used. The findings revealed that infrastructure exerts a negative influence on the industrial sector growth in Nigeria. Particularly, the result showed that on one hand, public capital infrastructure captured by infrastructure development index, human capital development measured by human development index and inflation rate have negative relationship with the industrial sector growth in both the OLS and GMM frameworks. Broad money supply and exchange rate on the other hand, were found to have a positive relationship with industrial sector growth in both the OLS and GMM frameworks. It is thus concluded that for Nigeria, infrastructure exerts a negative impact on industrial sector growth.

[8] explored debt–growth nexus in 118 developing, emerging and advanced economies for the period of 1960 to 2012. The study focused on long-run relationship based on theoretical arguments and data considerations in modeling the debt–growth relationship as heterogeneous across countries. The study also adopted the linear and non-linear specifications, employing novel methods and diagnostics from the time-series literature. The result supported a negative relationship between public debt and long-run growth across countries, with no evidence for a similar, let alone common, debt threshold within countries.

[10] examined the effect of external borrowing and foreign financial aid (foreign grant) in the form of Official Development Assistance (ODA) on the growth of the Nigerian economy over a period of 34 years (1980 to 2013). The study employed Ordinary Least Square technique (OLS) multiple regression and Error Correction Model (ECM) mechanism. Diagnostic tests such as Unit Root test using Augmented Dickey-Fuller (ADF) approach, and Johansen Co-integration test was considered. The results show that while external debt has a positive and significant effect on economic growth, foreign aid in conformity with the a priori expectation is positively related to GDP as well but statistically insignificant. This implies that foreign aid is beneficial to Nigeria but has not been much felt. Hence bulk of such funds (foreign aid) are being **c**hanneled to meeting recurrent or consumption expenditure needs of the country at the expense of productive investments.

[11] examined the impact of public sector borrowings on prices, interest rates, and output in Nigeria. It utilized a Vector Autoregressive framework, the Granger causality test, impulse response, and variance decomposition of the various innovations to study the impact. It found that shock to external debt stock increases prime lending rate, but with a lag. However, the level of external and domestic debt over the period of this study had no significant impact on the general price level and output.

[12] analyse the impact of external debt on economic growth in Nigeria. The variance decomposition and impulse response from Vector Auto-Regression (VAR) was the econometric technique employed to test whether or not External Debt, Ratio of External debt to Exports and other economic control variables stimulate economic growth. Based on the two-stage data processing, the result reveals a weak causation between external debt and economic growth in the Nigerian context. This implies that external debt could not be used to forecast improvement or slowdown in economic growth in Nigeria.

[13] used error correction model (ECM) to analyse the effect of Total External Debt

(TED) on the Nigerian economy proxied by Gross Domestic Product (GDP) during the period 1980-2015. The data such as TED and GDP were obtained from Central Bank of Nigeria (CBN) statistical bulletin. The result of the finding revealed that total external debt exerts negative and significant influence on GDP. This implies that, as total external debt increases, GDP decreases and vice versa. Therefore, the researcher recommended that any external loan obtained by the government should be channeled to productive projects that yield high on returns on investment rather than allocating the fund to finance dead-weight debt, hence, engendering sustainable economic growth in the economy.

[7] empirically investigated the impact of external debt on economic growth in Nigeria from 1980-2013. The authors employed Ordinary Least Square regression analysis considering diagnostic tests such as Augmented Dickey-Fuller Unit Root Test, Co-integration and Error Correction Model. The findings revealed that External Debt had a positive relationship with Gross Domestic Product at short run, but a negative relationship at long run. Also, while External Debt Service Payment had negative relationship with Gross Domestic Product, Exchange Rate had a positive relationship with it. The authors therefore concluded that exchange rate fluctuation had positive impact on the Nigerian economy while external debt stock and debt service payment had negative impact on the same economy. The study therefore recommended amongst others, that Debt Management Office should set mechanism in motion to ensure that loans were utilized for purposes for which they were acquired as well as set a ceiling for borrowing for states and federal governments based on well-defined criteria.

METHODOLOGY

This study adopted the *ex-post facto* research design since it is based on a historic data. It covered the period from 1981-2017. The data used was annual time series secondary data extracted from the Central Bank of Nigeria (CBN) statistical bulletin (2017) edition and National Bureau of Statistics (NBS) annual reports. Other sources of numerical information were Journals articles, Newspapers, textbooks and other published and unpublished materials.

Model framework adopted was Granger (1969) mechanism for causal or directional relationship between two variables. Particularly, the Vector Autoregressive (VAR) method of Granger causality model was adopted. The relational model is specified thus:

$OTP = f(PUBD)$ - - - - - - - - - (eqn 1)

Where,

OTP = Output of Industrial Sector

PUBD = Public Debt

The public debt can further be specified as:

$PUBD = f(EXD, DDT)$ - - - - - - - - (eqn 2)

Where,

EXD = External debt operationalized by multilateral debt (MLD); DDT = Domestic debt.

For this study to address the stated objective, equation 1 for public debt-Industrial sector output is represented in Pairwise Granger causality model as:

$$OTP_t = \alpha_0 + \alpha_{1i} \sum_{i=1}^{k} LnPUBD_{t-i} + \beta_{1i} \sum_{i=1}^{k} LnOTP_{t-i} + \mu_t \quad \text{- - (eqn 3)}$$

$$PUBD_t = \delta_0 + \alpha_{2i} \sum_{i=1}^{k} LnOTP_{t-i} + \beta_{2i} \sum_{i=1}^{k} LnPUBD_{t-i} + \mu_t \quad \text{- - (eqn 4)}$$

Such that:

$$\text{LnOTP}_t = \alpha_0 + \alpha_1 \sum_{i=1}^{k} LnEXD_{t-i} + \beta_1 \sum_{i=1}^{k} LnDDT_{t-i} + \pi_1 \sum_{i=1}^{k} LnEXR_{t-i} + \theta_1 \sum_{i=1}^{k} LnINF_{t-i} + \delta_1 \sum_{i=1}^{k} LnOTP_{t-i} + \mu_t \quad \text{(eqn 5)}$$

$$\text{LnEXD}_t = \varphi_0 + \alpha_2 \sum_{i=1}^{k} LnOTP_{t-i} + \beta_2 \sum_{i=1}^{k} LnDDT_{t-i} + \pi_2 \sum_{i=1}^{k} LnEXR_{t-i} + \theta_2 \sum_{i=1}^{k} LnINF_{t-i} + \delta_2 \sum_{i=1}^{k} LnEXD_{t-i} + \mu_t \quad \text{(eqn 6)}$$

$$\text{LnDDT}_t = \omega_0 + \alpha_3 \sum_{i=1}^{k} LnOTP_{t-i} + \beta_3 \sum_{i=1}^{k} LnEXD_{t-i} + \pi_3 \sum_{i=1}^{k} LnEXR_{t-i} + \theta_3 \sum_{i=1}^{k} LnINF_{t-i} + \delta_3 \sum_{i=1}^{k} LnDDT_{t-i} + \mu_t \quad \text{(eqn 7)}$$

From the models above,

EXR = Exchange rate,
INF = Inflation rate,
μ_t = Random/stochastic error associated with model.
Ln = Log-transformational operator.

$\alpha_i, \varphi_0, \omega_0, \beta_i, \pi_i, \theta_i$, and δ_i are the model parameters

Description of Model Variables

Industrial Output (OTP): The industrial output refers to the total inflation-adjusted value of output produced by manufacturers.

External debt (EXD): These are the portion of a country's debts that are borrowed from foreign lenders.

Domestic debts (DDT): These are debts instrument issued by the federal government and denominated in local currency.

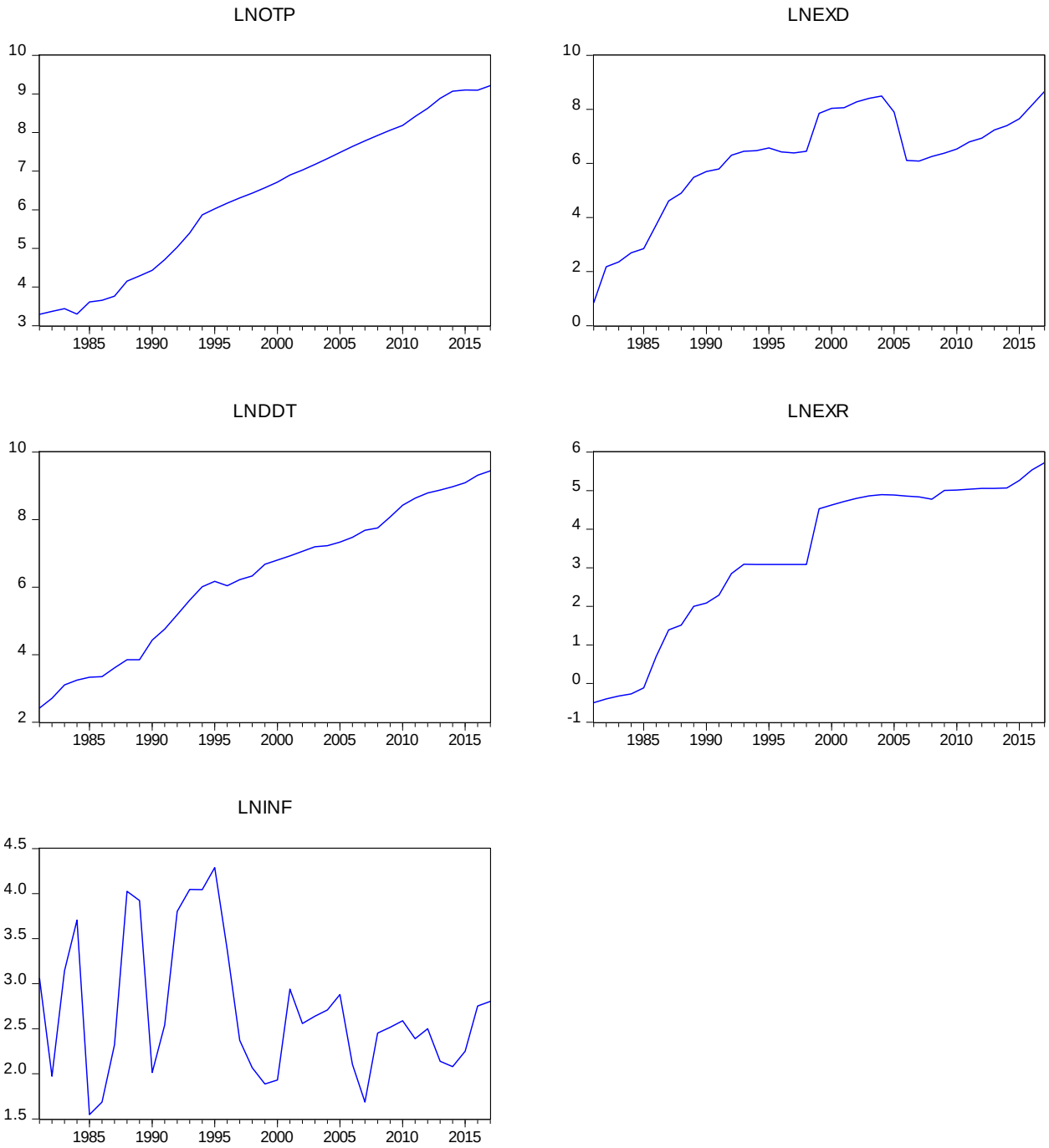
ANALYSIS OF DATA AND INTERPRETATION OF RESULTS

Table 1: Annualized time series data of Output of Industrial sector (OTP), External debt (EXD), Domestic debt (DDT), Exchange rate (EXR) and Inflation rate (INF).

Years	OTP (₦'B)	EXD (₦'B)	DDT (₦'B)	EXR (₦/US$1.00)	INF (%)
1981	26.89	2.33	11.19	0.6100	21.4
1982	29.09	8.82	15.01	0.6729	7.2
1983	31.13	10.58	22.22	0.7241	23.2
1984	27.12	14.81	25.67	0.7649	40.7
1985	37.14	17.3	27.95	0.8938	4.7
1986	38.65	41.45	28.44	2.0206	5.4
1987	43.22	100.79	36.79	4.0179	10.2
1988	63.52	133.96	47.03	4.5367	56
1989	72.90	240.39	47.05	7.3916	50.5
1990	84.27	298.61	84.09	8.0378	7.5
1991	110.60	328.45	116.20	9.9095	12.7
1992	153.47	544.26	177.96	17.2984	44.8
1993	221.23	633.14	273.84	22.0511	57.2
1994	354.66	648.81	407.58	21.8861	57
1995	414.13	716.87	477.73	21.8861	72.8
1996	477.95	617.32	419.98	21.8861	29.3
1997	546.71	595.93	501.75	21.8861	10.7
1998	620.20	633.02	560.83	21.8861	7.9
1999	713.82	2577.37	794.81	92.6934	6.6
2000	826.03	3097.38	898.25	102.1052	6.9
2001	989.11	3176.29	1,016.97	111.9433	18.9
2002	1127.23	3932.88	1,166.00	120.9702	12.9
2003	1304.07	4478.33	1,329.68	129.3565	14
2004	1516.05	4890.27	1,370.33	133.5004	15
2005	1778.73	2695.07	1,525.91	132.1470	17.8
2006	2082.49	451.46	1,753.26	128.6516	8.2
2007	2401.19	438.89	2,169.64	125.8331	5.4
2008	2761.55	523.25	2,320.31	118.5669	11.6
2009	3170.82	590.44	3,228.03	148.8802	12.4
2010	3578.64	689.84	4,551.82	150.2980	13.3
2011	4527.45	896.85	5,622.84	153.8616	10.9
2012	5588.82	1026.9	6,537.54	157.4994	12.2
2013	7233.32	1387.33	7,118.98	157.3112	8.5
2014	8685.43	1631.52	7,904.03	158.5526	8.0
2015	8973.77	2111.53	8,837.00	193.2792	9.5
2016	8903.24	3478.92	11,058.20	253.4923	15.7
2017	10,044.48	5787.51	12,578.80	305.7901	16.5

***Source: CBN statistical Bulletin, 2017* edition**

Fig. 1: Graphical representation of the study variables



Source: *Author's result*

The trend result shows that the series of OTP and DDT exhibit a smooth steady rise over the period. For the EXD, there was a sharp drop in 2005 and 2006 which is attributable to the debt relief of 2005. The external debt (EXD) rises slowly up to

₦5787.51 billion in 2017. Exchange rate shows a rough steady rise within the period while inflation rate (INF) exhibits a random pattern for the period.

Table 2: Description of study variables

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis	Observations
OTP	2150.25	713.82	2988.95	1.52	3.97	37
EXD	1336.46	633.02	1563.40	1.34	3.70	37
DDT	2299.02	794.81	3357.96	1.68	4.78	37
EXR	82.79	92.69	80.41	0.71	2.87	37
INF	20.09	12.7	17.96	1.53	4.10	37

Source: Author's computation using Eviews 10

The descriptive statistics result which shows the mean, median, standard deviation, skewness and kurtosis of the dataset indicates that the series of the datasets are highly volatile (with high standard deviations). The result of the skewness and kurtosis which measures the degree of departure from symmetry and peakedness of the distribution respectively shows that dataset of each of the variables are skewed to the right (positively skewed) with only exchange rate (EXR) not having excess kurtosis (k<3).

Following the rule of thumb, the DDT and INF with kurtosis values of 4.78 and 4.10 respectively indicate that the series are mesokurtic while the series of OTP and EXD with kurtosis values 3.97 and 3.70 are platykurtic.

Table 3 ADF unit root test Result

Variable	ADF-Stat	Critical Values @5%	p-value	Order of Integration	Inference
LnOTP	-4.473	-3.544**	0.0056	I(1)	Stationary
LnEXD	-4.461	-3.544**	0.0058	I(1)	Stationary
LnDDT	-4.538	-2.948**	0.0009	I(1)	Stationary
LnEXR	-5.108	-2.948**	0.0002	I(1)	Stationary
LnINF	-3.524	-2.948**	0.0129	I(0)	Stationary

** Indicates stationary at 5% level of significance
Source: *Author's Extract from E-views 10 Result*

The ADF stationarity test result in table 3 shows that the variables are not integrated of the same order for which course the Autoregressive Distributed Lag (ARDL) cointegration approach is employed to ascertain whether there are long run equilibrium relationships among the variables. The ARDL cointegration is as presented in table 4 below:

Table 4: ARDL Bounds Test

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic : n=1000	
F-statistic	5.599290	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Author's Extract from Eviews 10 result

The ARDL cointegration test result with F-statistic value of 5.599 >lower bound and upper bound critical values at 10%, 5%, 2.5%, and 1% levels indicate that there is a long-run relationship between public debt and industrial growth in Nigeria.

Table 5: Pairwise Causality Test Result

Sample: 1981 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LnEXD does not Granger Cause LnOTP	35	1.48609	0.2424
LnOTP does not Granger Cause LnEXD		0.64704	0.5307
LnDDT does not Granger Cause LnOTP	35	8.80282	0.0010
LnOTP does not Granger Cause LnDDT		0.77013	0.4719
LnEXR does not Granger Cause LnOTP	35	3.39521	0.0469
LnOTP does not Granger Cause LnEXR		0.61283	0.5485
LnINF does not Granger Cause LnOTP	35	0.55745	0.5785
LnOTP does not Granger Cause LnINF		7.52935	0.0022
LnINF does not Granger Cause LnDDT	35	0.03567	0.9650
LnDDT does not Granger Cause LnINF		7.77853	0.0019

Source: Author's Eviews 10 output

The pairwise granger causality test result in table 5 above provided empirical evidence that a uni-directional relationship runs from domestic debt to industrial productivity in Nigeria while there is no causal relationship between external debt and productivity of industrial sector in Nigeria. This implies that domestic debt drives the growth of industrial sector in Nigeria without a feedback. The domestic debt was also found to granger cause inflation in Nigeria.

The result also shows that exchange rate granger cause industrial sector growth and that growth in the industrial sector in Nigeria causes inflation.

CONCLUSION AND RECOMMENDATION

This study has explored the causal relationship between public debts and industrial sector growth in Nigeria. Employing the Pairwise Granger causality test approach, the findings revealed that there is a unidirectional causality running from public domestic debt to industrial sector growth in Nigeria while there is no directional relationship between external debt and productivity of Nigerian industrial sector for the period under review. In the light of the findings above, the following recommendations were made:

1) The government should ensure economic and political stability in order to enjoy the benefits of domestic debts.
2) Government should as a matter of urgency begin the process of diversifying its economic base to avoid over reliance on borrowings to finance its deficits.
3) Macroeconomic policies should be targeted towards maintaining a low rate of interest as it would contribute to economic growth of the country.
4) Government should divest all projects which the private sector can handle including refining crude oil (petroleum product) and transportation.
5) The regulatory authorities should provide enabling environment for private sector investors such as tax holidays, subsidies, guarantees and most importantly improved infrastructure.
6) Government should maintain a proper balance between short-term and long-term debt instruments in such a way that long-term instruments dominate the debt market.
7) There is need for the government to sustain commensurate growth-inducing levels of domestic debts at all times.

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