Response of Foreign Private Investment to Public Debt in Nigeria

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The study investigates the long-term relationship and dynamic short-term impact of public debt on foreign private investment for a developing country – Nigeria during the period 1962 to 2012. The paper deploys cointegration model to examine long-term relationship between the variables. The study also examines dynamic short-term impact and causality between public debt and foreign private investment using the VECM and Granger causality test. The study further examines the response paths of foreign private investment variable due to public debts shocks using variance decomposition. The results confirm absence of long-term relationship between public debt and foreign private investment in Nigeria. The results also show that external debt has negative impact on foreign private investment in the short-term. Finally, the results show that there is no causality between foreign private investment and public debt. The major economic implication of these findings is for debt management authorities to be conscious of growing external debts as it discourages foreign private investments into Nigeria.

Keywords: Public debt, foreign private investment, cointegration, developing economy
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1   Introduction

It is not contentious that majority of the developing countries have, in recent times, intensified efforts in attracting foreign private investments to their economies. Foreign private investment[2], generally, plays an important role in driving growth through increase in productivity levels (Borenstein & Lee, 1998). It brings technology, creates employment and enhances productivity by bringing competition in the economy. It also brings improvements in the quality of labour and capital inputs in the host economy. Ayyoub, Chaudhry & Yaqub (2012) explain that most underdeveloped economies depend heavily on external resources to make their nations developed and prosperous. However, excessive public debt retards foreign private investment (Iyoha, 1999).

Existing empirical studies have shown that governments in developing economies, where budget deficit and financial gaps exist between savings and investment, use debt as an imperative tool to finance its expenditures. According to Sheikh, Faridi & Tariq (2010) there are three major reasons for public domestic debt. First, it is used to finance budget deficit. Second, it is used to implement monetary policy through open market operations. Third, there is need to develop and deepen the financial markets by the instruments of domestic debt. Alam & Taib (2012) observe that financing through debt is an important tool for the government that plays a vital role towards economic development as it accelerates the pace of development of infrastructure of the country. But if the proceeds of public debt are not prudently invested, it would not only result in debt overhang but would also retard economic growth and development.

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[2] FPI is an investment made by a private individual or a private entity in a foreign country. This type of investment differs from other investments made by a foreign public or governmental entity in another country in that it is made by an individual or a private entity.

Debt overhang refers to a situation where a government or an organization has existing debt so great that it cannot easily borrow more money, even when that new borrowing is actually a good investment that would more than pay for itself. Under this situation, the government contracts new debt in order to service old debt thus accumulate debt in place of accumulating of infrastructural facilities and capital stock that would provide sustainable environment for private investments to thrive. The increase in level of debt increases debt servicing obligation, generates resource allocation problem in the national budget and generates temptation for shifting of resources from development to debt servicing sector. Consequently, the citizens face their welfare loss in terms of decrease in economic activities in the country (Alam & Taib, 2012).

Importantly, excessive public debt may discourage investment. Akujuobi (2012) for instance, observes that it is a problem to borrow heavily from internal and external sources to fund different sectors of Nigerian economy with doubtful corresponding gains. Such unsustainable public debt is a potential threat to investment in physical capital and foreign investment. When external debt reaches a high level, investors lower their expectations on investment returns with the possibility of progressively more distorted taxes by the government for debt repayment. In this way, high debt discourages domestic and foreign investment incentive and also slows down physical capital accumulation. In the same vein, Iyoha (1999) argues that inefficient allocation of resources and political corruption in Sub-Saharan Africa has resulted in large stock of external debt and debt service payment which attributes to negative effect on investment. Any reduction in current public debt stock and resulting reduction in debt service should promote current investment for any given level of future indebtedness. Part of the resources that would have gone into debt service will therefore be channeled towards productive investment thereby reduce

crowding-out of domestic investment and enhance confidence of foreign private investors' confidence in the domestic economy.

A good number of research efforts have been concentrated on public debt. But majority of these earlier empirical studies were conducted to investigate the impact of public debt on economic growth and development (see for example, Ihimodu, 1985; Anyanwu, 1994; Udoka & Anyingang, 2010; Emmanuel, 2012; Akujuobi, 2012; Erhieyovwe & Onovwoakpoma, 2013). Empirical study on the relationship between public debt and foreign private investment, in the Nigerian case, is scant, despite the importance of foreign investment in attracting scarce technology, creating employment and enhancing productivity. This paper contributes to fill this research gap by investigating the response of foreign private investment to public debt in Nigeria. Empirical evidence of this relationship has important implications for foreign investment, formulation of public debt policies and development of the financial market in Nigeria. It will, for instance, reveal the magnitude and nature of impact which public debt exert on foreign investment, thereby guide the government borrowing policies, and foreign investors in making direct investment decisions. It will also provide enrich the existing literature on public debt and foreign investment in developing economies and provide reference on the relationship for future studies. The remainder of the paper is organised as follows. Section 2 presents theoretical framework and brief review of literature. Section 3 provides methodology and data. Section 4 presents empirical results and discussions, and section 5 provides the conclusions.

2   Theoretical Framework and Brief Review of Related Literature
2.1   Theoretical Framework: Debt Overhang and Investment
The theoretical framework adopted for analysis of the response of foreign private investment to public debt is the debt overhang theory. Debt overhang, according to Krugman (1988), is a situation when the

contractual value of debt is less than the expected repayment on external debt. The theory debt overhang focuses on the adverse effects of external debt on investment in physical capital. First, when external debt reaches a high level, investors lower their expectations on investment returns with the possibility of progressively more distorted taxes by the government for debt repayment. In this way, high debt discourages domestic and foreign investment incentive and also slows down physical capital accumulation. With the debt-overhang theory, potential private investors prefer to wait for the change of circumstances. Moreover, the investment is more likely to be directed into channels with quick returns rather than into long-run beneficial ones. Thus debt-overhang hinders productivity growth both with low incentive for improvement and resource misallocation.

2.2   Brief Review of Related Literature

Numerous empirical studies have examined the relationship between external public debt and foreign private investment in both developed and developing economies. The results of some of these empirical studies are mixed. Borensztein (1990) found that debt overhang had an adverse effect on private investment in Philippines. The effect was strongest when private debt rather than total debt was used as a measure of debt overhang. In a later study, Borenstein & Lee (1998) show that foreign private investment has significant effect on the host country, for example, a one percent point rise in the ratio of foreign direct investment and gross domestic product increase the rate of per capita income growth of the Less Develop Countries (LDCs) by 0.3 percent to 0.8 percent.

Cohen (1993) expressed the relationship between the face value of debt and investment as a kind of Laffer curve such that foreign borrowing has a positive impact on investment and growth up to a certain level; beyond this level, however, its impact is adverse. Similarly, Aremu (1997) conducts a research on foreign private investment in Nigeria, its

determinants, performance and promotion; he find that foreign private investment has a positive effect on economic development in the LDCs. He further submitted that foreign private investment accelerates the pace of economic growth of the LDCs up to a point where a satisfactory rate of growth can be achieved on a self-sustaining basis.

Ajisafe et al. (2006) investigates the causal relationship between external debt and foreign private investment in Nigeria between 1970 and 2003. Result of the cointegration test shows, among other, that the external debt and foreign private investment are not related in the long run.

Agada & Okpe (2002) examine the determinants of risks on foreign investment in Nigeria from 1980 to 2000. Their results show that inflation rate, exchange rate, and political and administrative risk inhibit foreign investment in Nigeria. Ayashagba & Abachi (2002) investigate the effect of foreign private investment on economic growth in Nigeria from 1980 to 1997. Their results show that foreign private investment had significant impact on economic growth and with the tendency of reducing poverty in Nigeria. They therefore conclude that though foreign private investment has a significant impact on Less Development Countries (LDCs) but its presence does not reflect on the growth of these economies. In the same vein, Okpe & Abu (2005) and Olayem (2014) reveal that foreign private investment has not significantly contributed to poverty alleviation in Nigeria.

In an earlier study, Iyoha (1999) argued that Sub-Saharan Africa is faced with large stock of external debt and debt service payment which attributes to negative effect on investment. This stems from inefficient allocation of resource and political corruption which dwindles most economies of Sub-Saharan Africa. This suggests that insignificant impact of foreign private investment and poverty reduction and growth may be as a result of borrowing in excess of the sustainable level as well as inability to channel borrowings in sustainable projects.

The literature on the relationship between public debt and foreign private investment in both developed and developing economies is growing. Many of the studies agree that public debt has a positive impact on investment and growth up to a certain level, after which its impact become negative. Other studies show that foreign private investment is not bad but inefficient allocation of resource and political corruption tend to misdirect the funds that supposed to be used to enhance the adoption of non-existing technology and bring improvements in the quality of labour and capital inputs in the host economy.

3. Data and Methodology
3.1 Data
The data used in this study are annual series of the foreign private investment (FPI) and public debt, which is decomposed into domestic debt (DD) and external debt (ED). The sample spans from 1962 to 2012, which yields a total of 51 observations for each of the variables. The series were converted to growth rates at time t, proxied by the difference change in the individual series as follows:

$$C_t = (S_t / S_t\{1\} - 1) \qquad (1)$$

Where, C_t represents the growth rates for individual series under study in year t and S_t is a vector of the annual series of the variables (i.e., FPI, DD, and Ed).

3.2 Methodology
The concept of cointegration, developed by Granger (1981) and Engle & Granger (1987), is based on the principle that even though two nonstationary time series may, individually, not be stationary but there exists a linear combination of them that is a stationary stochastic process. For cointegration to exist, the nonstationary time series, under study, have to be stationary after the same number of differencing. This implies that they should be integrated of the same order. The

augmented Dickey-Fuller (ADF) unit root test following Dickey & Fuller (1979) and Kwiatkowski, Phillips, Schmidt & Shin (1992) stationarity test are adopted to investigate the order of integration and stationarity of the foreign private investment and public debt series. The cointegrating regression model, adopted to examine the nature of long-run relationship between foreign private investment and public debt in Nigeria, is specified thus:

$$FPI_t = \delta_0 + \delta_1 ED + \delta_2 DD + \mu_t \qquad (2)$$

Where *FPI* is the dependent variable and is the observations of yearly foreign private investment in Nigeria at time t, ED_t is the annual observations of the external debt at time t, DD_t is the yearly observations of domestic debt at time t, δ_1 and δ_2 are the coefficients of external and domestic debts respectively and show their impact on foreign private investment. μ_t is the stochastic error term at time t. The residuals from the cointegrating regression are stored and used as the variable for conducting the Engle-Granger test of cointegration. The *apriori* expectation, based on the debt overhang theory, is that public debt will have a significantly negative impact on foreign private investment.

The test for long-run relationship and hence cointegration between foreign private investment and public debt is accomplished using the Engle-Granger (EG) residual-based test (Nnachi, 2008). The EG residual-based test involves applying the saved residuals in an auxiliary regression of the form:

$$\Delta\mu_t = \phi\mu_{t-1} + \varepsilon_t \qquad (3)$$

Where, $\Delta\mu_t$ are the estimated first differenced residual, μ_{t-1} are the estimated lagged residuals, ϕ is the parameter of interest representing slope of the line, ε_t are errors obtained in fitting both differenced residuals. EG residual-based test involves testing the null hypothesis of no cointegration between a set of variables. Rejecting the null

hypothesis of a unit root is evidence in favour of cointegration (Engle & Granger, 1987; Lee, 1993).

3.3 Vector Error Correction Model Specification

If evidence of cointegration is observed between foreign private investment and public debts, it would imply that there exists a long-term equilibrium relationship between them, so vector error correction model would be estimated to evaluate the short run properties of the cointegrated series. VECM leads to better understanding of the short-term interaction between different stationary series. It describes a system in which each variable is a function of its own lag, and the lag of the other variable in the system. In case of no cointegration, VECM would no longer be required and we directly proceed to estimate variance decomposition and Granger causality tests to establish the dynamic interaction and causal links between variables. The VECM for foreign private investment and public debts, decomposed into external and domestic debts, may be specified in this way:

$$CFPI_t = \alpha_1 + \alpha_f \hat{\varepsilon}_{t-1} + \sum_{j=1} \beta FPI_{t-j} + \sum_{j=1} \gamma ED_{t-j} + \sum_{j=1} \xi DD_{t-j} + \mu_{1t} \qquad (4)$$

$$CED_t = \alpha_2 + \alpha_e \hat{\varepsilon}_{t-1} + \sum_{j=1} \theta FPI_{t-j} + \sum_{j=1} \lambda ED_{t-j} + \sum_{j=1} \varsigma DD_{t-j} + \mu_{2t} \qquad (5)$$

$$CDD_t = \alpha_3 + \alpha_d \hat{\varepsilon}_{t-1} + \sum_{j=1} \phi FPI_{t-j} + \sum_{j=1} \eta ED_{t-j} + \sum_{j=1} \psi DD_{t-j} + \mu_{3t} \qquad (6)$$

Where, C denotes the first difference operator, γ and ξ measure the short-term effects of public debt on foreign private investment, θ measures the short-term effect of foreign private investment on external debt, μ_{1t}, μ_{2t} and μ_{3t} are white-noise residuals and, α_f, α_e and α_d are the error correction parameters. The error correction coefficients are expected to be significantly negative for the series to converge to long-run equilibrium. Negative and statistically significant ECM coefficient is

regarded as a convincing evidence and confirmation for the existence of cointegration (Engle & Granger, 1987). Large values of the error correction parameter will indicate faster adjustment to long-run equilibrium given shocks to the system.

3.4   Variance Decomposition

Variance decomposition would be applied to examine the dynamic interaction between foreign private investment, external debt and domestic debt in the short-term. Variance decomposition is an innovation accounting technique that can be used to obtain information concerning the interaction among variables (Lutkepohl & Reimers (1992) in Enders, 2004: 338). It allows for tracing the time path of the impact of a shock in one variable on all the variables included in the VAR model.

3.5   Granger Causality Test Results

Granger causality tests are applied to examine causal links between variables. Here the tests are applied to investigate the direction of causal relationship (if any) between foreign private investment and public debts in Nigeria. A general specification of the Granger causality test in a bivariate (X, Y) context can be specified as follows:

$$Y_t = 0 + 1Y_{t-1} + \ldots\ldots iY_{t-i} + 1X_{t-1} + \ldots\ldots iX_{t-i} + \mu \qquad (7)$$

$$X_t = 0 + 1X_{t-1} + \ldots\ldots iX_{t-i} + 1Y_{t-1} + \ldots\ldots iY_{t-i} + \mu \qquad (8)$$

Where, the subscripts t and $t\text{-}1$ denote time periods and μ is a white noise error. The constant parameter 0 represents the constant growth rate of Y in the equation (7) and X in the equation (8). Granger (1969) shows that X Granger-causes Y if Y can be forecast better using past Y and past X than just past Y. Sample f-test is applied to examine causality in the variables. A significant f-statistic implies that lagged changes in a variable Y Granger cause changes in variable X. Unidirectional causality

will occur between two variables if either null hypothesis of equation (7) or (8) is rejected. Bidirectional causality exists if both null hypotheses are rejected and no causality exists if neither null hypothesis of equation (7) nor (8) is rejected (Duasa, 2007).

4.   Empirical Results and Discussions
4.1   Descriptive Statistics

Figure 1, shows time series plots of annual level and growth series of the FPI and ED from 1962 to 2012. The level of FPI shows upward trend from ₦441.2 million in 1962 to ₦397395.20 in 2007. While FPI started moving northward from 1991, ED 'skyrocketed' in the second quarter of 1999 before falling in 2006 following Paris Club debt relief. Another key feature of Figure *1* is that ED is, again, moving northward. Notice also that the level series appear non-stationary as they show trend movement, whereas the growth series appear stationary.

The Level and Growth Series of Foreign Private Investment, Domestic and External Debts
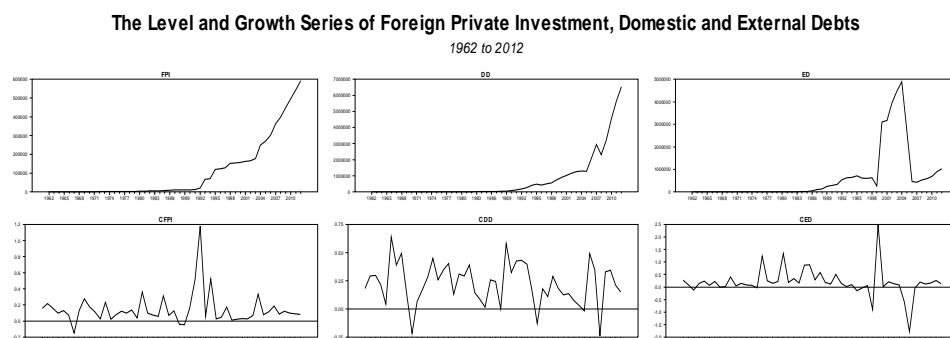*1962 to 2012*

Figure 1

Table 1 shows descriptive statistics for the level series and growth series of the FPI and ED. The average FPI and ED are ₦103665 and ₦641639, respectively for the 1962-2012 periods. The annual average change series for FPI, DD and ED are 14%, 22% and 19% respectively, for the period under study. This suggests that, on average, domestic

debt is growing at higher rates than foreign private investment. But external debt has higher standard deviation (55%) than the other variables. Again, the skewness coefficients of the growth in FPI and Ed are significantly positively skewed but DD is not skewed. The excess kurtosis coefficients, which measure the fatness of the tails of the distribution, are high for both FPI (16) and ED (8). The excess kurtosis of a normal distribution is 0, indicating that the normality assumptions for FPI and ED are doubtful but not for DD. Finally, the Jarque-Bera test for normality of growth distribution yields high statistics for FPI and ED, thus rejecting the null hypotheses of normally distributed growth rates at conventional confidence levels FPI and ED but DD appears to be normally distributed.

Table 1

Descriptive Statistics

	Mean	S.D	Skew	Kurt	JB Stat	Mean	S.D	Skew	Kurt	JB Stat
	Level Series					Growth Series				
FPI	103665	159813	1.695 (0.00)	1.998 (0.00)	32.93 (0.00)	0.143	0.19	3.461 (0.00)	16.5 (0.00)	668.1 (0.00)
ED	641639	1198743	2.436 (0.00)	5.107 (0.00)	105.9 (0.00)	0.191	0.55	0.705 (0.00)	8.225 (0.00)	145.1 (0.00)
DD	750241	1449744	2.627 (0.00)	6.886 (0.00)	159.4 (0.00)	0.225	0.18	-0.273 (0.44)	0.272 (0.71)	0.778 (0.67)

Note: *P*-values are displayed as (.). SD is the standard deviation, Skew is the skewness, Kurt is the excess kurtosis and JB stat is the Jarque-Bera test for normality. The Skew, Kurt and JB tests are conducted under null hypothesis of no skewness, no excess kurtosis and normal distribution at 95% confidence levels.

4.2   *Results of Tests for Stationarity*

Table 2 presents the results of the Augmented Dickey-Fuller (ADF) unit root test and Kwiatowski, Phillips, Schmidt, and Shin (KPSS) stationarity test for the level series and growth series of FPI, DD and Ed. Unit root test is particularly important to ensure that the series are stationary, as estimate obtained from nonstationary series are not reliable. It is visible from *Table 2* that the level of all the series contain unit root at conventional confidence level. However, in the case of the growth series, the statistics reject the null hypothesis of a unit root at the 1% significance level, implying that the growth series are stationary for all the series. The results of the KPSS tests, on the other hand, show that the level series are non-stationary, whereas, their growth rates are stationary.

Table 2

Unit Root and Stationarity Tests Results

	Level			Growth		
ADF	critical value 5%		computed value	critical value 5%		computed value
FPI	-2.919		-0.1305	-2.920		-5.913**
ED	-2.919		-1.1356	-2.920		-6.885**
DD	-2.919		-1.3152	-2.920		-5.928**
KPSS	critical value 5%		computed value	critical value 5%		computed value
FPI	0.463		1.108**	0.463		0.077
ED	0.463		1.043**	0.463		0.191
DD	0.463		1.122**	0.463		0.181

Note: FPI is foreign private investment and Ed is external debt. ADF lag length is selected using Bayesian information criterion (BIC). **, * indicates significant at 99% and 95% confidence level respectively.

4.3   Cointegration Test Results
4.3.1 Result of Tests for Long-run Relationship

This section presents the results of the cointegrating regression and E-G residual-based tests specified in equation 2 and 3. As shown in *Table 3*, the coefficient of the external debt is negative but not significant. The results of the residual-based test, as shown in *Panel B of Table 3*, reveal that there is no cointegration (i.e. long-run relationship) between foreign private investment and public debt in Nigeria. The computed *tau* (τ) statistic (-2.17) is higher than the 5% critical tau (τ) value (-2.91) and so this falls within the acceptance region of the test. Since the computed τ value is higher than the conventional critical tau values, we accept the null hypothesis of no cointegration at the 5% level of significance. This result agrees with the finding of Ajisafe et al. (2006), who document evidence of no long-term relationship between foreign private investment and external debt in Nigeria.

Table 3

Engle-Granger Cointegration Test

Variable	Coefficient	*T*-Stat	Significance Level
Constant	2.490	11.523	0.000
ED	-0.053	-0.964	0.339
DD	0.730	11.626	0.000
Panel B: E-G Residual-based Test			
Variables	Critical Value 5%		Computed Statistic
μ_t	-2.919		-2.171

Note: μ_t is the residual from the cointegrating regression expressed in equation (1). *d* is the cointegrating regression Durbin-Watson and its 5% critical value. ** and * indicate significance at 1% and 5% levels.

4.3.2 Results of Error Correction Model

Table 4 presents the results of the error correction models (ECM) specified in equations 4, 5 and 6 estimated to examine the response of foreign private investment to public debt in Nigeria. Observe from *Table* 4 that growth in external debt has negative and significant short-term effects on growth in foreign private investment at the 1%

significant level; whereas growth in domestic debt is negative at all lags but not significant. Equations 4 and 5 show, on the other hand that, that external debt and domestic debt respond only to their previous values. This evidence of significant negative impact of external debt on foreign private investment suggests that growth in external debt discourages foreign private investment in Nigeria. The results also provide support for debt overhang theory and the findings of Borensztein (1990) and Iyoha (1999). According the debt overhang theory, when external debt reaches a high level, investors lower their expected return on investment because of the increased possibility of government demanding more taxes in order to service the higher debt. In this way, high debt discourages foreign investment incentive thereby slows down physical capital accumulation. The Nigerian public debt, for example, was sustainable up to mid 1970's. From the late 1970's, because of poor macroeconomic management and declining prices of crude oil, the country's public debt, especially the external debt, began its upward movement. Thus, from external debt of US$ 557.74 million in 1975, Nigeria debt peaked at US $33.1 billion in 1990. In 2004, prior to the Paris Club debt relief, Nigeria's external debt stood at US$35.9 billion while the stock of the domestic debt amounted to US$10.3 billion resulting in a total public debt of about US$46.2 billion or 64.3% of GDP. Such a large amount of external debt, with its attendant negative press reportage, may explain the negative impact of external debt on foreign private investment in Nigeria.

The results of VECM presented in Table 4 also provide support for the evidence of no cointegration provided by the cointegrating regression above. The *VECM* coefficients of equation 4, 5, and 6 (α_f, α_e and α_d) do not display the expected signs – that is negative and statistically significant coefficients. This suggests that foreign private investment and public debt does not follow the same growth path in long-term.

Table 4
Vector Error Correction Model Estimates

Variables	Equation 4 Coefficients	Equation 5 Coefficients	Equation 6 Coefficients
D_CFPI{1}	0.1423 [0.532]	0.1005 [0.901]	0.1533 [0.584]
D_CFPI{2}	0.3344 [0.098]	0.0079 [0.991]	0.1471 [0.548]
D_CFPI{3}	0.1723 [0.262]	0.0505 [0.926]	-0.067 [0.718]
D_CED{1}	-0.039 [0.396]	-0.783 [0.000]*	0.0064 [0.910]
D_CED{2}	-0.102 [0.063]***	-0.522 [0.010]*	0.0317 [0.635]
D_CED{3}	-0.096 [0.039]**	-0.260 [0.117]	0.0151 [0.788]
D_CDD{1}	-0.009 [0.947]	0.3066 [0.553]	-0.561 [0.003]*
D_CDD{2}	-0.060 [0.683]	0.1526 [0.774]	-0.426 [0.024]**
D_CDD{3}	0.160 [0.251]	0.4770 [0.340]	-0.204 [0.237]
EC1{1}	1.0210 [0.000]	0.3075 [0.748]	0.2674 [0.420]
Durbin-Watson	1.884	2.084	2.086

Note: *, **, *** indicate significance at the 1%, 5% and 10% levels respectively. [.] is the *p*-value.

4.4   Variance Decomposition

Notice from step 1 in table 6 that 100% of the variance of the one-step forecast error is due to innovation in change in foreign private investment itself, whereas 1.39% change in external debt is due to change in foreign private investment. But at longer lags, innovations in changes in external debt have significant effects on foreign private investment. In the same vein, domestic debts significantly impact foreign private investment from lag four. Again, while domestic debt has increasing effect on external debt, the former has decreasing effect on the latter.

Table 5

Variance Decomposition

Panel A: Decomposition of Variance for Series CFPI				
Step	Std Error	CFPI	CED	CDD
1	0.1699	100.000	0.000	0.000
2	0.1726	98.246	0.615	1.139
3	0.1810	93.201	5.761	1.039
4	0.1889	86.512	6.642	6.846
5	0.1959	83.587	9.935	6.478
6	0.1971	83.393	9.890	6.717
7	0.1990	83.115	10.152	6.733
8	0.1996	82.659	10.209	7.132
9	0.1999	82.365	10.393	7.242
10	0.2001	82.252	10.382	7.366
11	0.2006	81.874	10.335	7.790
12	0.2010	81.611	10.371	8.017
Panel B: Decomposition of Variance for Series CED				
Step	Std Error	CFPI	CED	CDD
1	0.6089	0.129	99.871	0.000
2	0.6265	0.577	98.198	1.225
3	0.6565	0.930	97.921	1.150
4	0.7051	1.013	96.165	2.822
5	0.7740	1.483	96.148	2.368
6	0.8041	1.507	96.069	2.425
7	0.8405	1.785	95.675	2.540
8	0.8787	1.712	95.757	2.531
9	0.9152	1.795	95.782	2.423
10	0.9466	1.828	95.784	2.388
11	0.9776	1.871	95.679	2.451
12	1.0103	1.903	95.691	2.406
Panel C: Decomposition of Variance for Series CDD				
Step	Std Error	CFPI	CED	CDD
1	0.2095	0.097	3.171	96.733
2	0.2317	1.037	2.773	96.190
3	0.2430	1.369	2.655	95.976
4	0.2659	5.239	2.256	92.505

5	0.2881	5.215	2.018	92.767
6	0.3067	5.521	1.796	92.683
7	0.3189	5.697	1.695	92.608
8	0.3351	5.622	1.654	92.724
9	0.3503	5.644	1.528	92.828
10	0.3641	5.593	1.420	92.987
11	0.3770	5.729	1.329	92.942
12	0.3902	5.779	1.260	92.961

Note: CFPI, CED, and CDD are the growth rates of foreign private investment, external debt and domestic debt respectively.

4.5   Granger Causality Test Results

Table 7 displays the results Granger causality test at lags 1 to 3 with Durbin-Watson statistic to account for first order autocorrelation in the residuals. It is glaring that there is no causality between foreign private investment and external debt or otherwise. There is also no causality between foreign private investment and domestic debt at the conventional significance level.

Table 6

Granger Causality Tests

Direction	df.	Coefficient	f-statistic	D-W
CFPI → CED	$F(3,40)$	0.9843	0.4098	2.0746
CFPI → CDD	$F(3,40)$	0.6213	0.6053	1.9766
CED → CFPI	$F(3,40)$	0.0822	0.9693	2.0151

Note: D-W is the Durbin-Watson test statistic. → indicate the direction of causality. Lag length is 1 to 3.

5.   Conclusions

The study investigates the long-term relationship and dynamic short-term impact of public debt on foreign private investment for a developing country – Nigeria for the data span 1962 to 2012. The paper employs cointegration model to examine long-term relationship between the variables, which has its advantage of application to level

series. The results of the cointegration model confirm absence of long-term relationship between public debt and foreign private investment in Nigeria. The study also examines dynamic short-term impact and causality between the variables using the VECM and Granger causality between public debt and foreign private investment variables. The results of the VECM show that external debt has negative and significant impact on foreign private investment in the short-term. The results also show that there is no causality between foreign private investment and public debt. The study further examines the response paths of foreign private investment variable due to public debts shocks using variance decomposition. The estimates of variance decomposition shows that, from longer lag 4, innovations in changes in public debts have significant effects on foreign private investment. Also, while domestic debt has increasing effect on external debt, the former has decreasing effect on the latter

The conclusion therefore is that growth in external debt has negative impact on foreign private investment. Hence, debt management authorities need to formulate proactive policies to control unsustainable growth in external debt as it discourages foreign private investments from flowing into Nigeria.

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