

FDI, Private Investment and Public Investment in Nigeria: An Unravelling Dynamic Relation

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Abstract

For decades, scholars have continually emphasized the importance of FDI in the Less Developed Countries. Suffice it to say that, some believe that FDI can fill investment gaps, either private or public and mobilizes savings (Lee and Suruga, 2005; Todaro and Smith, 2003; Hayami, 2001). This research therefore, seeks to verify the interactions and transmission mechanism between FDI, private direct investment and public direct investment in Nigeria. Furthermore, these variables were examined to ascertain their direction of causality and whether or not they have long run linear relationship. Also, the impulse responses of these variables to shocks in the extraneous variables were verified; using the Multiple-Equation VAR models with time series data ranging from 1970-2012. The co integration result indicates that there is no long run relationship between these variables. In addition, the variance decomposition result shows that 46 percent of innovations in FDI were explained by its own past values, while 21 percent of the innovations were due to shocks, to private domestic investment with 31 percent due to public investment. The response of public and private investment to shocks in FDI is positive and significant in the short run and so is consistent with the findings of Jansen (1995), Misun and Tomsik (2002). Efficient infrastructure in terms of public investment in basic infrastructure cannot be overemphasized amongst others.

Keyword:FDI,VAR Model, Variance Decomposition, Impulse Response, Endogeneity, Nigeria

JEL Classification:C13, C32, B41, E62, N77

1.0. Introduction

Over the years, developing nations have significantly striven to interrogate the inherent underlining the western world's higher growth rate. To this end, third world's economists and policy makers are often bewildered by the ostensible linkage between public investment, private investment and foreign direct investment for the sustenance of economic growth. Foreign direct investment (FDI) is an important promoter of economic development and economic growth as stipulated by (Le and Suruga, 2005). Many scholars have argued that the flows of FDI could fill the gap between desired investments and domestically mobilized saving (Todaro and Smith, 2003, Hayami, 2001). FDI has proven to have the capacity to increase tax revenues and improve management, technology, as well as labour skills in host countries as opined by (Todaro and Smith, 2003; Hayami, 2001). In addition, rise in FDI inflow has the tendency to assist the host country to break out of the vicious cycle of underdevelopment as observed by (Hayami, 2001).

In the past two decades, most developing countries have undertaken fiscal and financial reforms to encourage the inflow of foreign direct investment (FDI); expecting FDI flows to bring new technology, know-how and managerial skills. The amount of FDI flows to developing countries grew steadily in the 1990s and reached \$583 billion in 2009 in current US dollars (World Bank, 2009 and Saglam et al, 2011).

The increasing importance of FDI flows as a source of external funding for recipient countries has burgeoned into a compelling realization which dictates that FDI should be harnessed to promote domestic investment.

Since the unobtrusive link between foreign and domestic investment constitutes the key point in evaluating the FDI-growth relations, a number of studies have emerged to investigate whether FDI and domestic investment are complements or substitutes in the recipient countries. The research findings of the paper, essentially spell out that the effects of FDI on domestic capital accumulation may vary from country to country depending on the domestic policies and the corresponding degree of financial development (Alfaro et al., 2004), educational level (Borenstein et al., 1998), the size of the technological gap between multinational and domestic firms (De Mello, 1999), the types of FDI that a country receives and the sectoral distribution of FDI. The positive impact of FDI on domestic investment is often felt when FDI introduces new industries to the host country (Lipsey, 2002); through the provision of machinery and technology (Sun, 1998); and creates new demand for local inputs (Cardoso and Dornbusch, 1989). On the other hand, foreign and domestic investments are likely to be substitutes if foreign firms compete with domestic firms for the use of domestic resources and eliminate investment opportunities for the domestic investors (Fry, 1992; Jansen, 1995; Agosin and Mayer, 2000).

In the examination of nexus between FDI and domestic investment, the linkages among FDI, public investment and private investment also serves as a significant consideration. Remarkably, this consideration will enable us ascertain the necessary policy implications that can be utilized to maximize the gains from FDI at large. The reason for this is not far-fetched from the fact that these variables are often related over time and even in a dynamic relationship, where causality can run from both directions. Expectedly, a strong private investment climate can act as signals of high returns to capital, as well as an improved public infrastructure through public investment thereby reducing cost of doing business are vital in attracting foreign capital. From the foregoing, it is possible to assert that FDI could be seen as complement or substitute to different types of domestic investment. Despite its significance, the empirical evidence on this issue is scarce as buttressed by Saglam and Yalta (2011). Specifically, Ndikumana and Verick (2008) considered the case of Sub-Saharan African countries and found a two-way relation between FDI and private investment; however, their study confirmed that public investment is not a driver of FDI.

Similarly, Hooi et al (2011) examined the linkages among FDI, direct investment (DI) and economic growth in Malaysia for the period 1970-2009. They discovered that FDI, DI and economic growth are co-integrated. Furthermore, they established that a uni-directional causality exist between FDI and DI. Also, (Choe, 2003; Razin, 2003; Kim and Seo, 2003; Hecht et al, 2004; Apergis et al, 2006; Tang et al, 2008; Adams, 2009; Merican, 2009) empirically analyzed the dynamic linkages between FDI and domestic investment in influencing economic growth, both separately and together. To corroborate the above, Ang (2009) pinpoints that both public investment and FDI are complementary with private investment in Malaysia. The studies found the existence of the long run relationship among FDI, DI and economic growth but the direction of causality among the variables remain vague. For example, Choe (2003), Kim and Seo (2003), Hecht et al (2004) and Apergis et al (2006) found bilateral causal relationship between FDI and economic growth. In contrast to the above, Tang et al (2008) discovered in his study that there is only one way causality from FDI to DI and to GDP in China, while the causal link between DI and economic growth is bi-directional.

In the same vein, Agosin and Machado (2005) have observed that if FDI crowds out DI, the increase in total investment would be smaller than the increase in FDI. And if on the other hand, there is a crowding in, the increase in total investment will be more than the increase in FDI. In contrast to the aforementioned, Kim and Seo (2003) opines that an expansion in FDI neither crowds in nor crowds out the DI in South Korea. However, Wang (2010) found that contemporaneous FDI crowds out DI in the developing countries. Ang (2009) examined the long run relationship between Private DI, public investment and FDI in Malaysia for the period of 1960-2003. The results showed that public investment, private investment and FDI are co-integrated in the long run. Moreover, both FDI and public investment are statistically significant and positively related to the private DI.

Merican (2009) examined the linkages between FDI, DI and economic growth in four ASEAN members namely: Indonesia, Malaysia, Thailand and the Philippines over the period of 1970-2001. Focusing on Malaysia, the study found that FDI was better than DI in promoting economic growth in Malaysia. Saglam et al (2011) investigated the relationship among FDI, private investment and public investment in Turkey for the period 1970-2009 using a multivariate VAR model. Results imply that there is no long-run relationship among FDI, public and private investment; suggesting that there is no interaction among public, private and foreign investments in the long run.

They recommended that the government of Turkey should improve their infrastructure through increase in public investment, stabilize prices, and correct fiscal deficiencies with both macroeconomic and political stability so as to increase inflow and benefits of FDI.

Marc et al (2012) investigated the impact of domestic investment on Foreign Direct Investment (FDI) in Developing Countries (DC). Using a cross-country sample (68 countries), over a period (1984-2004), he discovered that lagged domestic investment has a strong influence on FDI inflows in the host-economy, implying that domestic investment is a strong catalyst for FDI in DC and that Multinational Companies do follow economic development. Vietnam has been reasonably successful in attracting FDI since it implemented its Foreign Investment Law in 1987. According to Ministry of Planning and Investment, from 1987 to the end of 2003, total FDI inflows to Vietnam were approximately US\$ 40.8 billion in terms of commitments, while the actual inflows were US\$ 25 billion. This influx of dollar encouraged GDP growth, international trade and employment (Tran, 2005). He did a panel analysis of twelve provinces in Vietnam, looking at the relationships between FDI and economic growth; and then FDI and poverty using two models. In order to ascertain the relationship among these three important variables, he adopted the Two Stage Least Square Methods for his analysis. His result shows that FDI had a positive impact on economic growth and was statistically significant; also economic growth had a positive and significant impact on poverty reduction in Vietnam.

Okon et al (2012) investigated the relationship between foreign direct investment and economic growth in Nigeria between 1970 and 2008. They proposed that there is endogeneity i.e. bi-directional causality between FDI and economic growth in Nigeria; single and simultaneous equation systems were employed to examine if there is any sort of feed-back relationship between FDI and economic growth in Nigeria. Their results showed that FDI and economic growth are jointly determined in Nigeria and that there is positive feedback from FDI to growth and from growth to FDI. They further suggested policies that attract more foreign direct investment to the economy, greater openness and increased private participation and reinforcement to ensure that the domestic economy captures greater spillovers from FDI inflows and attains higher economic growth rates.

Owing from the above, the objectives of this research are to verify the interactions and transmission mechanism among foreign direct investment, private domestic investment and public domestic investment by considering the case of Nigeria. Furthermore, the variables shall be examined to ascertain their direction of causality and if they have long run relationship (Co-integration); finally, the impulse response of these variables to shocks in the extraneous variables shall also be verified.

The current economic reforms going on in Nigeria calls for a study of this nature. Also, just like other developing countries, Nigeria is going through a substantial process of liberalization with macroeconomic and political instability (Terrorism), and high inflation rates which is currently causing financial melt-down and decline in the expansion of industries. In this respect, to meet its financial needs, Nigeria has been building up new rules and regulations in the hope of attracting FDI since the 1980s. As a result, she has experienced a substantial increase in the amount of FDI flows in recent years. The FDI flows to Nigeria were #4024.0 million in 1986; #10,450.2million in 1990; #16,453.6million in 2000 and #54,254.2million in 2007. Yet, the question remains as to the possible effects of foreign investment on domestic investment. Some studies find a positive association between FDI and domestic investment, (Eroglu and Hudson, 1997; Insel and Sungur, 2003; Kara and Kar, 2005), whereas some conclude that FDI negatively affects domestic investment (Güven, 2001).

This research work differs from the previous studies in two ways. Firstly, it focuses on the dynamic interactions among the variables by using a multivariate VAR framework. Sincerely, this is among the few studies that employ time series techniques to examine the linkages between FDI, private investment and public investment in Nigeria. Secondly, the earlier studies focus on the broad relationship between total domestic investment and FDI; and then FDI and economic growth thereby overlooking the dynamic connections among FDI, public and private investment. In addition, evidence from other studies pinpoints that their focus is on the macroeconomic impact of FDI thereby using simple estimation methods, such as Ordinary Least Squares (OLS).

Therefore, the issues of stationarity and the endogeneity of the variables are generally not addressed. This is evident in the review of literature on FDI in Nigeria. The remaining sections of this research work are divided into section 2 Review of Literature in Nigeria; section 3 Methodology and Data; section 4 Empirical Analysis and Results Presentation; section 5 Policy Recommendations and Conclusion.

2.0. Review of Literature and Empirical Evidence (A Case of Nigeria)

There are several Nigeria-specific studies on FDI. Some of the pioneering works include: Aluko (1961), Brown (1962) and Obinna (1983). These authors separately reported that there is a positive linkage between FDI and economic growth in Nigeria. Edozien (1968) discussed the linkage effect of FDI on the Nigerian economy and submits that these have not been considerable and that the broad linkage effects were lower than the Chenery-Watanabe average. Oseghale and Amonkhienan (1987) found that FDI is positively associated with GDP, concluding that greater inflows of FDI will spell a better economic performance for the country.

Odozi (1995) placed special emphasis on the factors affecting FDI flows into Nigeria in both pre and post Structural Adjustment Programme (SAP) eras and found that the macro policies in place before SAP were discouraging investors. This policy environment led to the proliferation and growth of parallel markets and sustained capital flight. Adelegan (2000) explored the Seemingly Unrelated Regression model (SUR) to examine the impact of FDI on economic growth in Nigeria and found out that FDI is pro-consumption, pro-import and negatively related to gross domestic investment. In another paper, Ekpo (1995) reported that political regime, real income per capita, inflation rate, world interest rate, credit rating and debt service were the key factors explaining the variability of FDI inflows into Nigeria.

Similarly, Ayanwale and Bamire (2001) assessed the influence of FDI on firm level productivity in Nigeria and reported positive spillover of foreign firms on domestic firm productivity. Ariyo (1998) studied the investment trend and its impact on Nigeria's economic growth over the years. He found that only private domestic investment consistently contributed to raising GDP growth rates during the period considered (1970-1995). Furthermore, there is no reliable evidence that all the investment variables included in his analysis have any perceptible influence on economic growth. He therefore suggested the need for an institutional rearrangement that recognizes and protects the interest of major partners in the development of the economy.

A common weakness that has been identified in most of these studies is that they failed to control for the fact that most of the FDI inflows to Nigeria has been concentrated on the extractive industry (to oil and natural resources sector). According to Ayanwale (2007), these works invariably assessed the impacts of FDI inflows to the extractive industry on Nigeria's economic growth. Akinlo (2004) specifically controlled for the oil, non-oil FDI dichotomy in Nigeria. He investigated the impact of foreign direct investment (FDI) on economic growth in Nigeria, using an error correction model (ECM). He found that both private capital and lagged foreign capital have small and not a statistically significant effect on economic growth. Further, his results support the argument that extractive FDI might not be growth enhancing as much as manufacturing FDI.

Examining the contributions of foreign capital to the prosperity or poverty of LDCs, Oyinlola (1995) posits that foreign capital includes foreign loans, direct foreign investments and export earnings. Using Chenery and Stout's two-gap model (Chenery and Stout, 1966), he concluded that FDI has a negative effect on economic development in Nigeria. Further, on the basis of time series data, Ekpo (1995) reported that political regime, real income per capita, rate of inflation, world interest rate, credit rating and debt service were the key factors explaining the variability of FDI into Nigeria. However, Anyanwu (1998) paid particular emphasis on the determinants of FDI inflows to Nigeria. He identified change in domestic investment, change in domestic output or market size, indigenization policy and change in openness of the economy as major determinants of FDI inflows into Nigeria and that it effort must be made to raise the nation's economic growth so as to be able to attract more FDI.

Ayanwale (2007) investigated the empirical relationship between non-extractive FDI and economic growth in Nigeria and also examined the determinants of FDI inflows into the Nigeria economy. He used both single-equation and simultaneous equation models to examine the relationship. His results suggest that the determinants of FDI in Nigeria are market size, infrastructure development and stable macroeconomic policy. Openness to trade and human capital were found not to be FDI inducing. Also, he found a positive link between FDI and growth in Nigeria. Our work is similar to that of Ayanwale (2007), in that we seek to examine the determinants and impact of FDI on growth in the Nigerian economy.

3.0 Model Specification

The three variables of foreign direct investment (FDI_t), private investment ($DPRV_t$) and domestic public investment ($DPUB_t$) at time were determined and expressed in the natural log values of the data to express them in common denominator.

Since we are interested in examining the dynamic interactions between private investment, public investment and FDI, we rely on a vector autoregressive model (VAR) and in order to understand the dynamics of responses, both the impulse response functions (IRFs) and variance decomposition (VD) are used.

More so, the impulse response functions track the responsiveness of the regressands in the VAR to shocks to each of the other variables while the variance decompositions provide information on the proportion of the movements in the dependent variables accounted for by their own shocks vis-à-vis the shocks to other factors. This approach has also been used by Kim and Seo (2003), and Tang et al. (2008) to examine the relationship between FDI and investment in Korea and China respectively. VAR model has certain advantages in that in a VAR model, dependent variables are expressed as functions of their own and each other's lagged values and all the variables are allowed to affect each other (Enders, 2005). Following Bayraktar and Yasemin (2011), we use a general unrestricted *P*th order VAR model as follows:

$$Y_t = \alpha + \sum_{l=1}^m \alpha_l Y_{t-l} + \varepsilon_{t-1} \tag{1}$$

Where Y_t refers to investment measures (domestic private investment, domestic public investment and FDI), t ($t = 1 \dots T$) refers to the time period, and l refers to the lag number. ε_t is the error term. However, a VAR (p) trivariate model in the context of this study could then be expressed as thus:

$$\ln FDI_t = C + \sum_{j=1}^p \alpha_{1j} \ln FDI_{t-j} + \sum_{j=1}^p \alpha_{2j} \ln DPRV_{t-j} + \sum_{j=1}^p \alpha_{3j} \ln DPUB_{t-j} + \varepsilon_{1t} \tag{2}$$

$$\ln DPRV_t = C + \sum_{j=1}^p \beta_{1j} \ln DPRV_{t-j} + \sum_{j=1}^p \beta_{2j} \ln FDI_{t-j} + \sum_{j=1}^p \beta_{3j} \ln DPUB_{t-j} + \varepsilon_{2t} \tag{3}$$

$$\ln DPUB_t = C + \sum_{j=1}^p \delta_{1j} \ln DPUB_{t-j} + \sum_{j=1}^p \delta_{2j} \ln FDI_{t-j} + \sum_{j=1}^p \delta_{3j} \ln DPRV_{t-j} + \varepsilon_{3t} \tag{4}$$

The variance decomposition test result has shown that FDI contributes more towards the development of private investment in Nigeria and vice-versa. As a result of this, it will be necessary to ascertain the direction of causality between FDI and private investment.

The Granger causality model is of the form:

$$\ln FDI_t = C_1 + \sum_{j=1}^p \alpha_{1j} \ln FDI_{t-j} + \sum_{j=1}^p \alpha_{2j} \ln DPRV_{t-j} + \mu_{1t} \tag{5}$$

$$\ln DPRV_t = C_2 + \sum_{j=1}^p \delta_{1j} \ln DPRV_{t-j} + \sum_{j=1}^p \delta_{2j} \ln FDI_{t-j} + \mu_{2t} \tag{6}$$

As earlier defined, $\ln FDI$ denotes log of foreign direct investment, $\ln DPRV$ denotes log domestic private investment while $\ln DPUB$ represents log of domestic public investment.

4.0 Methodology and Data

4.1 Variable Description and Data Sources

Data used in this paper are annual figures covering the period 1981 – 2012 and the variables are sourced from Central Bank of Nigeria Statistical Bulletin for various years and World Development Indicators database (WDI). Foreign Direct Investment (FDI) was obtained via official aid and other development assistance (ODA), Gross Fixed Capital Formation was used to proxy Domestic Private Investment (DPRV) while Domestic Public Investment (DPUB) is measured as the sum of Federal Government Capital Expenditure on Economic Services and Social Community Services.

4.2 Empirical Analysis and Result Presentation

The analysis begins with ascertaining the order of integration of the variables. The procedure adopted in this study involves the use of the two standard unit root tests namely Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The null hypothesis of ADF and the PP tests is non-stationary, thus failure with respect to rejection implies unit root in the series. The obtained results are reported in Table 1 below where all the series appear to be integrated of order one, which is a standard result in the literature for series of this nature.

4.2.1 Unit Root Test

Table 1: Unit Root and Stationarity Tests

	Augment Dickey-Fuller (ADF)			Phillip-Perron (PP)		
	Level	First Difference	I(d)	Level	First Difference	I(d)
<i>LNFDI</i>	-1.4083 ^a	-5.5236 ^{a*}	I(1)	-2.5391 ^b	-7.1915 ^{a*}	I(1)
<i>LNDPRV</i>	-0.1688 ^a	-4.0574 ^{a*}	I(1)	0.2408 ^a	-3.7325 ^{a*}	I(1)
<i>LNDPUB</i>	-0.6106 ^b	-2.9317 ^{a***}	I(1)	-1.3526 ^b	-2.8776 ^{a***}	I(1)

Source: Authors Computation

Note: ^aIndicates a model with constant but without deterministic trend; ^b is the model with constant and deterministic trend as exogenous lags are selected based on Schwarz info criteria. *, **, *** imply that the series is stationary at 1%, 5% and 10% respectively. ADF and PP represent Augmented Dickey-Fuller and Phillips-Perron Unit Root tests respectively. The null hypothesis for ADF and PP is that an observable time series is not stationary (i.e. has unit root).

It is seen in the table above that the null hypothesis of a unit root is accepted for the level series, but rejected for the first differenced data thus indicating that all series are non-stationary in their levels but become stationary after taking the first difference. Following these unit root tests, the Johansen (1988) maximum likelihood approach to cointegration is employed to examine the presence of any long-run association among the variables.

Engle and Granger (1987) states that a linear combination of two or more non-stationary series may be stationary and in this case these non-stationary time series are said to be cointegrated. The stationary linear combination can be interpreted as a long-run relationship among the variables. Therefore, after confirming that FDI, DPRV and DPUB are all *I*(1), we continue with testing long-run cointegration relationship between the variables using Johansen cointegration technique. Since the Johansen approach is sensitive to the lag length chosen, we conduct a series of tests to determine the optimal lag length and choose a model with lag length 1.

In testing cointegration, two tests are used: the trace test and maximum eigenvalue test to determine the cointegration rank. In Table 2, we present Johansen Cointegration test results. In the first model, we try to identify if there is a long-run relationship between domestic private investment (DPRV) and FDI, in the second model, we equally examine the existence of long-run relationship between domestic public investment (DPUB) and FDI while model 3 examines if domestic private investment, domestic public investment and FDI are cointegrated.

4.2.2 Cointegration Test

Table 2: Johansen Cointegration Test Results

Model	Hypothesized Number of Cointegrated Equations	Eigenvalue	Trace Test	5% Critical Value
<i>Model 1</i> (<i>LNDPRV, LNFDI</i>)	None	0.28	9.94	15.49
	At most 1	0.02	0.55	3.84
<i>Model 2</i> (<i>LNDPUB, LNFDI</i>)	None	0.13	5.83	15.49
	At most 1	0.06	1.65	3.84
<i>Model 3</i> (<i>LNDPRV, LNDPUB, LNFDI</i>)	None	0.43	21.86	29.80
	At most 1	0.14	5.43	15.49
	At most 2	0.03	1.00	3.84

Source: Authors Computation

Note: * indicates the existence of no cointegrating relationship at the 5 percent significance level.

Looking across the three models, evidence reveal in Table 2 above implies we do not reject the null hypothesis that there is no cointegrating vector. To this end, we therefore conclude that there is no long-run relationship between domestic private investment and FDI, domestic public investment and FDI as well as private investment, public investment and FDI relationship even when examined simultaneously.

The implication from the aforementioned therefore suggests that FDI is neither a complement for domestic private investment nor a substitute for domestic public investment in Nigeria. This may not be unconnected to the fact that FDI to Nigeria has not been targeting the real sector of the economy, but are rather mainly capital intensive in telecommunications and oil sectors.

Given the above background, where evidence of no long-run cointegration among the variables that is; domestic and foreign direct investment is revealed, we then proceed as earlier stated to further examine the relationship between the variables while utilizing innovations that account for variance decomposition and impulse response function. However, the first differences of the variables will be employed since the variables are neither stationary nor cointegrated. The VAR model we estimated was ordered using Cholesky decomposition as FDI, PUB, and PRV. And this is because, the results of VAR can be very sensitive to the ordering of the variables, we tested other possible orderings and found that our results do not differ when the ordering of the variables is changed.

4.2.3 Variance Decomposition Functions

The variance decomposition allows us to make inference over the proportion of movements in a time series due to its own shocks versus shocks to other variables in the system (Enders 1995). The variance decomposition results reported within a 10-year horizon are presented in Table 3 below.

Table 3: Variance Decomposition Percentage of Ten-Year Error Variance

Percent of forecast error variance in:	Typical Shock in		
	<i>LNFDI</i>	<i>LNDPRV</i>	<i>LNDPUB</i>
<i>LNFDI</i>	46.70	21.67	31.62
<i>LNDPRV</i>	18.08	65.33	16.59
<i>LNDPUB</i>	6.21	21.10	72.70

Source: Authors Computation

The results show that 46 per cent of innovations in FDI are explained by its own past values, while 21 per cent of the innovations is due to shocks to private domestic investment with 31 per cent due to public investment. The forecast error variance of Nigerian private domestic investment is grossly explained by its own past values of 65 per cent, while shock to the domestic public investment and FDI accounts for 16 per cent and 18 per cent respectively. Consequently, the forecast error variance of the Nigerian public domestic investment by its own innovation is higher compared to that explained by the domestic private investment and FDI. From an economic point of view, these results indicate that FDI does not have a strong influence on Nigeria’s private and public domestic investment. Notwithstanding however, the influence of FDI on private domestic investment seems to be greater than that of domestic public investment.

In attempt to strengthen the robustness of this analysis, we further utilize impulse response function to examine the dynamic causal relationship between FDI, private and public domestic investment. The impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of endogenous variables. Figure 1 presents impulse responses to a shock in FDI.

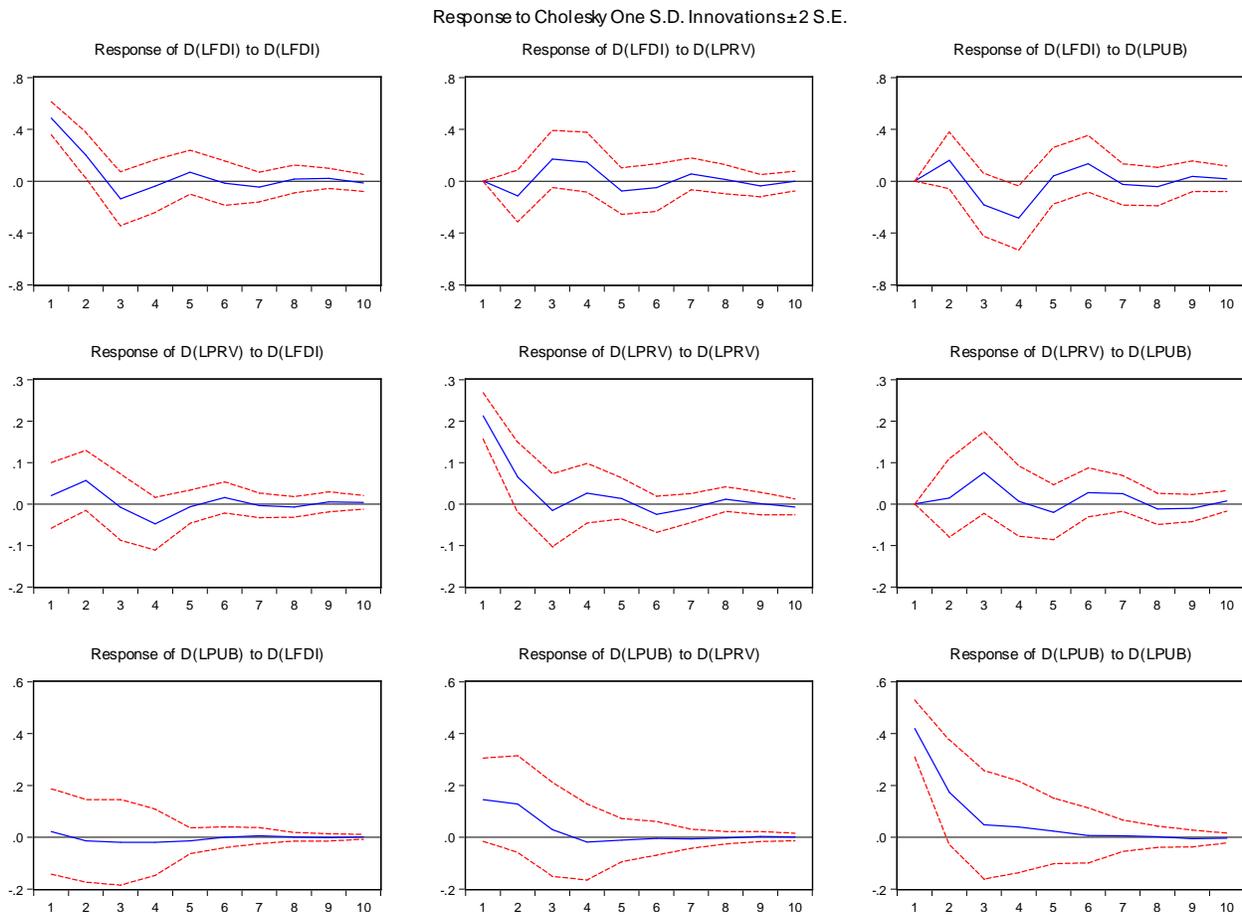
The accumulated impulse responses are plotted in Figure 1 and the dynamic responses are obtained from a time interval with ten periods. The main findings could be summarized as follows:

- I. There is no significant long-run linkage among private domestic investment, public domestic investment and FDI.
- II. Impulse response analysis reveal significant response of FDI to shocks in private and public investments, but the response is negative for private investment and positive for public investment.
- III. The response of public and private investment to a shock in FDI is reveal to be positive and significant in the short run. This finding is consistent with that of Jansen (1995) for Thailand and for Hungary and Czech Republic (see Misun and Tomsik, 2002).

IV. The response of public investment to a shock in private investment is negative and significant for the first three periods. On the other hand, the response of private investment to a shock in public investment is positive and as well significant. The latter result thus conform to the existing literature which suggest that efficient infrastructure in terms of public investment in basic infrastructure, such as roads, ports and telecommunications may contribute to private sector investments. This therefore, is an indication that an effective and efficient allocation of public resource is a significant means of promoting domestic private investment in Nigeria.

4.2.4 Impulse-Response Functions

Figure 1: Impulse Response Functions



5.0 Summary and Conclusions

African nations and specifically, Nigeria attach significant importance to foreign direct investment. Hence, an indispensable channel of the effects of FDI on development in the host economies is no doubt through the interactions between FDI and domestic public and private investment. This study therefore, seeks to provide evidence on these linkages to maximize the benefits of FDI. The findings of the paper have important policy implications on how to explore the benefit of FDI while giving due attention to the performance of both the private and public domestic investment. To this end, the study has investigated the relationships between FDI, private investment and public investment in Nigeria between the periods 1981-2012 using a multivariate VAR model. The paper pointedly suggests that, there is no long-run relationship between FDI, public and private investment. In other word, we find no interaction among public, private and foreign investments in the long run. The absence of long run relationship between the concern different types of investment in the context of this study thus implies that, more and deeper actions are required to improve the investment climate in Nigeria.

The hostile nature of most African countries (Nigeria inclusive) that often result from political, religious and ethnic difference might as well be responsible for the inability of FDI to positively boost domestic investment in Nigeria. In addition, the inadequate public infrastructure in terms of public investment, high inflation, fiscal deficiencies with macroeconomic instability in Nigeria are vices necessarily responsible for the poor interaction among different types of investment as found in this study. To attract and maximize gains from FDI in Nigeria would among other things require measures that can make the environment conducive for the domestic investment to thrive. This would expectedly attract investors from other part of the world and thus a necessity for establishing a meaningful and gainful interaction between the domestic and foreign investment in the long-run.

References

- Adelegan, J.O. 2000. "Foreign Direct Investment and Economic Growth in Nigeria: A Seemingly Unrelated Model", *African Review of Money, Finance and Banking, Supplementary Issue of Savings and Development*, Milan, Italy, pp: 5-25.
- Agosin, M. and R. Machado. 2005. "Foreign Investment in Developing Countries: Does It Crowd in Domestic Investment?", *Oxford Development Studies* 33(2): 149-162.
- Agosin, M. R and M. Ricardo. 2000. "Foreign Investment in Developing Countries: Does it Crowd-in Domestic Investment?" UNCTAD Discussion Paper, No: 146, Geneva: UNCTAD
- Akinlo, A. E. 2004. "Foreign direct investment and growth in Nigeria: An empirical investigation", *Journal of Policy Modelling*, 26: 627-639.
- Alfaro, L. A., S. K. Chanda and S. Sayek. 2004. "FDI and economic growth: The role of local Financial Markets", *J. Inter. Econ.*, 64(1): 89-112.
- Aluko, S.A. 1961. "Financing Economic Development in Nigeria", *Nigerian J. Econ. Soc. Stud.*, 3(1): 39-67.
- Anyanwu, J.C. 1998. "An Econometric Investigation of Determinants of Foreign Direct Investment in Nigeria", In *Investment in the Growth Process: Proceedings of the Nigerian Economic Society Conference*, Ibadan, Nigeria, pp: 219-240.
- Ariyo, A. 1998. "Investment and Nigeria's Economic Growth", In *Investment in the Growth Process: Proceedings of the Nigerian Economic Society Conference*, Ibadan, Nigeria, pp: 329-349.
- Ayanwale, A.B. and A.S. Bamire. 2001. "The influence of FDI on firm level productivity of Nigeria's Agro-Allied sector", *Final Report Presented to the African Economic Research Consortium*, Nairobi.
- Ayanwale, A.B. 2007. "FDI and Economic Growth: Evidence from Nigeria", *AERC Research Paper 165*, African Economic Research Consortium, Nairobi.
- Brown, C.V. 1962. "External Economies and Economic Development", *Nigerian J. Econ. Soc. Stud.*, 4(1): 16-22.
- Borensztein, E., J. De Gregorio and J.W. Lee. 1998. "How Does Foreign Investment Affect Growth?" *Journal of International Economics* 45 (1): 115-135.
- Cardoso, E. and Dornbusch R. 1989. "Foreign Private Capital Flows", *Handbook of Development Economics*, in Hollis Chenery and T.N. Srivasan (ed.), *Handbook of Development Economics*, edition 1, volume 2, chapter 26, pages 1387-1443.
- Chenery, H.B. and A. Stout. 1966. "Foreign Assistance and Economic Development", *American Econ. Rev.*, 55: 679-733.
- De Mello, L.R. 1997. "Foreign direct investment in developing countries and growth: A selective survey", *J. Dev. Stud.*, 34: 1-34.
- De Mello, L. 1999. "Foreign Direct Investment Led Growth: Evidence From Time Series and Panel Data", *Oxford Economic Papers* 51: 133-151.
- Edozien, E.G. 1968. "Linkages Between Direct Foreign Investment and Nigeria's Economic Development", *Nigerian J. Econ. Soc. Stud.*, 10(2): 119-203.
- Ekpo, A.H. 1995. "Foreign Direct Investment: Evidence From Time Series Data", *CBN Econ. Financial Rev.*, 35(1): 59-78.
- Enders, W. 1995. "Applied Econometric Time Series", New York: John Wiley and Sons Inc.
- Engle, R. F. and W. J. Granger. 1987. "Co-integration and Error Correction: Representation, Estimation and Testing", *Econometrica*, 55, issue 2, p. 251-76,
<http://econpapers.repec.org/RePEc:ecm:emetrp:v:55:y:1987:i:2:p:251-76>
- Eroglu, O. and J. Hudson. 1997. "The Effects of Foreign Capital Inflows in Turkey", *Hacettepe University Journal of Economics and Administrative Sciences* 15 (1).

- Guven, S. 2001. "Sermaye Hareketlerinin Nedenleri, Etkileri ve Türkiye Örneği", İktisat, İşletme ve Finans Dergisi, 16 (185), ss. 79-98.
- Hayami, Y. 2001. "Development Economics: From the Poverty to the Wealth of Nations", Oxford University Press, 2001.
- Insel, A. and N. Sungur. 2003. "Effect of Capital Flows on Basic Macroeconomic Indicators: Evidence from Turkey", 1989 III-1999. <http://www.tek.org.tr/toplanti/php>
- Jansen, K. 1995. "The Macroeconomic Effects of Direct Foreign Direct Investment: The Case of Thailand", World Development, 23, 193-210.
- Kar, M. and M. A. Kara. 2005. "Yabancı Sermaye Çeşitlerinin Yatırımlar ve Tasarruflar Üzerine Etkilerinin Ekonometrik Analizi", Journal of Economics, Business and Finance, 20 (228): 93-108.
- Lipsey, R.E. 2002. "Home and host country effects of FDI", NBER working paper: 9293.
- Ndikumana, L. and S. Verick. 2008. "The Linkages between FDI and Domestic Investment: Unravelling the Developmental Impact of Foreign Investment in Sub-Saharan Africa", Development Policy Review 26(6): 713-726.
- Obinna, O.E. 1983. "Diversification of Nigeria's External Finances through Strategic Foreign Direct Investment", Nigerian Economic Society, Annual Conference Proceedings, JOS, 13-16th May.
- Odozi, V.A. 1995. "An overview of foreign investment in Nigeria 1960-1995", Occasional Paper No. 11 Research Department, Central Bank of Nigeria.
- Oseghale, B. D. and E. E. Amonkhienan. 1987. "Foreign debt, oil export, direct foreign investment (1960-1984)", Nigerian J. Econ. Soc. Stud., 29(3): 359-380.
- Oyinlola, O. 1995. "External Capital and Economic Development in Nigeria (1970-1991)", Nigerian J. Econ. Soc. Stud., 37(2-3): 205-222.
- Saglam B. B. and A. Y. Yalta. 2011. "Dynamic Linkages Among Foreign Direct Investment, Public Investment and Private Investment: Evidence From Turkey", Applied Econometrics and International Development Vol. 11-2: 71-82.
- Sun, H. 1998. "Macroeconomic Impact of Direct Foreign Investment in China: 1979-1996", the World Economy, 21 (5): 675-94.
- Todaro, M. P. and S.C. Stephen. 2003. "Economic Development". Pearson Education Limited.
- Trans Trong H. (2005) impact of FDI on Poverty Reduction In Vietnam: IDS GRIPS.
- World Bank. 2009. "Global Economic Prospects and the Developing Countries, Investing to Unlock Opportunities", Washington D.C.