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DYNAMIC INTERACTION AMONG EXTERNAL DEBT, FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN NIGERIA

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ABSTRACT

The study examines the dynamic interaction between foreign debt, foreign direct investment (FDI) and economic growth in Nigeria. The aim of the study is to offer empirical proof of the current type of relationship between Nigeria's external debt, foreign direct investment and economic growth. In this study, secondary data from 1980 to 2016 was used. Data on external debt, foreign direct investment and economic growth was obtained from the Statistical Bulletin released by the Central Bank of Nigeria. A vector autoregressive model was performed to determine interaction effects among the three variables. The result showed that only economic growth and FDI has a positive retaliating interaction. Although both the FDI and economic growth responded positively to innovation in external debt, external debt responded negatively to innovation in both economic growth and FDI, respectively. The results further showed that there exists a

unidirectional causal relationship between foreign direct investment and economic growth which runs from FDI to economic growth at 5% level of significance, thus demonstrating the positive retaliating interaction of FDI and economic growth. Policies on borrowed fund for productive investment, alternative means of financing its deficit and improving the economic condition of the Nigerian business environment, are recommended.

Keywords: economic growth, external debt, foreign direct investment, vector autoregressive model

1. INTRODUCTION

Among its macro-economic goals, one of the pertinent objectives of any government is to achieve economic growth through its fiscal policies. In most developing countries of the world, Nigeria included, achieving this objective seems difficult without seeking external funding, either through borrowing, which results in external debt, or through motivating for foreign direct investment (FDI).

Over the years, the Nigerian government has been incurring external debt. This is because the government's revenue base, *vis á vis* its expenditure, has been turning the government towards borrowing to finance its deficit (Oladipo & Akinbobola, 2011). For instance, Nigeria's external debt increased from 8.93 trillion naira in 1980 to 18.65 trillion naira in 1985, and 33.46 trillion naira and 34.09 trillion naira in 1990, and 1995 respectively. It fell to 32.37 trillion naira, 25.75 trillion naira and 15.48 trillion naira in 2000, 2005 and 2010, respectively. However, it increased again to 29.03 trillion naira in 2015 (Central Bank of Nigeria/CBN, 2016). This trend occurred while the government was attempting to improve economic growth through which economic development could emerge.
Although the country has been experiencing economic growth over the years (except for 1985 and 1995), with a general increase in FDI over the period under review (with the exception of 2015), it cannot be concluded that the growth in FDI and economic growth can be juxtaposed against the

increase in external debt, without empirical investigation which considers debt overhang theory.

Generally, "debt overhang" nations with high indebtedness are regarded as a major cause of distortion and decreasing economic growth (Bulow & Rogoff, 1990). Based on this concern, the world's developing countries are now campaigning toward FDI instead of incurring more debt over the years. It should be observed that FDI generates extra financing possibilities without raising a country's external debt. Officials in Nigeria have tried to attract FDI through numerous reforms. These reforms include economic deregulation, the 1989 industrial policy, the establishment of the Nigeria Investment Promotion Commission (NIPC) in the early 1990s, as well as the signing of bilateral investment treaties (BITs) in the late 1990s.

This is understandable, as the role of foreign direct investment (FDI) in Nigeria's growth cannot be over-emphasised. FDI offers capital for investment; it enhances work development and organisational abilities and facilitates potential technology transfer (Ayanwale, 2007).

2. LITERATURE REVIEW

In this section, various economic theories and empirical studies on external debt, foreign direct investment and economic growth are reviewed.

For many years, the correlation between the FDI inflow to host nations and economic development has been subject to strict studies. In theory, the causal relationship between growth in FDI and GDP can run in either direction. According to the FDI-led growth hypothesis, FDI inflows can boost development for host nations by raising capital stock, generating fresh work possibilities and facilitating technology transfer (Borensztein et al., 1998; De Gregorio, 2003; De Mello, 1997).

On the one hand, there exist some studies on external debt and economic growth with conflicting results. For instance, the studies by Moga et al. (2016), Osuji and Ozuruma (2013), Yagoob and Zhengming (2013), Sulaiman and Azeez (2012), Ajayi and Oke (2012), Tokunbo, Risikat and

Oladele (2010) among others, found a positive relationship, while most scholars have recorded contradicting studies (see Bolanle et al., 2015; Farhana & Chowdhury 2014; Zouhaier & Fatma, 2014; Aminu et al., 2013; Azam et al., 2013; Izedonmi & Ilaboya, 2012, and Obademi, 2012).

On the other hand, is the contradicting result that exists between FDI and economic growth among scholars. For instance, studies from Muhammad and Ijirshar (2015); Melnyk et al. (2014); Anwar (2014); Alkhathlan (2014) and Umoh et al. (2012), are of the opinion that FDI affects economic growth positively. Contrarily, studies like Moga et al. (2016), Bolanle et al. (2015); Onyeagu and Okeiyika (2013) and Azman-Saini et al. (2010), argue that there exists a negative relationship between economic growth and FDI. The empirical relationship that exists between external debt and FDI seems to be scarce in the literature, except for the work of Neumann (2003), who disclosed the connection between national investment and FDI interaction by incorporating global debt. She argues that domestic investors cannot credibly disclose the amount of first-period investment to global creditors due to information asymmetry. Thus, they choose to incur the cost of self-monitoring to boost capital flows. They may also sell some ownership to foreign investors as an alternative to international borrowing. Neumann (2003) claims that both FDI and foreign debt may encourage national investment in a developing country, but FDI dominates foreign borrowing as an instrument to boost national investment in the nation. Moreover, Neumann's (2003) work did not confirm a specific linkage between external debt and FDI.

Therefore, based on the conflicting results that have been produced in the literature, it will be important to examine the dynamic interactions among external debt, FDI and economic growth, with the following objectives in mind;

i. To investigate the interactive effects among external debt, foreign direct investment and economic growth in Nigeria, and
ii. To examine the existing causal relationship between external debt, foreign direct investment and economic growth in Nigeria.

This becomes necessary since the interactions among these macro-economic variables seem to be very scarce in the literature and moreover, the transmission from one variable to the other could determine the medium through which the effects of the other could be investigated in providing guidance for policymakers. Moreover, the empirical investigation of their dynamics from 1980 to 2016 in Nigeria will assist policymakers in knowing which of these variables will guide policy direction.

2.1 External debt theories

Typically, the concept of a financing gap has infested developing nations that have considerably encouraged so-called foreign borrowing. A financing gap is fundamentally the distinction between the resources accessible from national sources and the total investment requirement, and one way to close this gap is by borrowing from overseas. Easterly (1999) reported that the concept originated in Domar (1946) in a paper entitled *Capital Expansion, Growth Rate and Employment*, where it was postulated that there would be a proportionate connection between investment expenditure and cumulative gross domestic product (GDP) growth.

The financing gap concept resurfaced in Rostow's (1960) *The Stages of Economic Growth*, where it is argued that for any nation to move from being less developed to a developed economy, it needs to pass through a series of occurrences or phases. There is a proportionate connection between such investment and economic growth and development. Rostow deduced that the required situation for take-off is that investment rises from 5% to 10% of profits, which implies that if a developing nation does not have sufficient national funds for investment, it must fill the gap with international assistance or external debt.

2.1.1 The Debt Overhang Theory

External lending is overstocked with the presumed adverse connection between foreign debt and investment, resulting in reduced capital

formation. Krugman (1988) describes this adverse connection as debt overhang, where the potential of repayment of outstanding equipment falls below the signed value. The research provided a straightforward definition of the debt overhang issue, as the expected present value of any prospective resource allocation that is not up to its exceptional loan. Several academic studies (such as Krugman, 1988 and Sachs, 1988) supported the theoretical case for debt overhang. Others like Greene and Villanueva (1991), Elbadawi et al. (1997) and Chowdhury (2001) reconfirmed this by providing sufficient evidence to support the debt overhang phenomenon.

Debt overhang is regarded as a major cause of distortion and slowing down of economic growth in heavily indebted countries (Sachs, 1989; Bulow & Rogoff, 1990). Economic growth is slowing down because these nations are losing their grip on private investors.

2.2 Foreign Direct Investment theories

2.2.1 FDI-led hypothesis

For many years, the correlation between the FDI inflow into host nations and economic development has been subject to strict studies. The causal relationship between FDI and GDP development can, in theory, run in either direction. On the one side, according to the FDI-led growth hypothesis, FDI inflows can boost development for host nations by raising capital stock, generating fresh work possibilities, and facilitating technology transfer (Borensztein et al., 1998; De Gregorio, 2003; de Mello, 1997). Furthermore, while current studies usually indicate a beneficial effect of FDI on economic growth, it is also feasible that FDI may have adverse impacts on economic growth by overcrowding national investment, increasing external vulnerability, and causing reliance (Aitken & Harrison, 1999; Lipsey, 2002). Last but not least, there may also be no causal relationship between FDI and economic growth, promoting the so-called neutrality hypothesis.

2.2.2 Endogenous growth model theory

Endogenous growth model theory states that physical investment is not a measure of a country's economic growth, but the effectiveness and efficiency of using these assets is such a measure. Economic models of endogenous growth were implemented to examine the impacts of FDI on economic growth through technology diffusion (Barro, 1991). Romer (1990) claims that FDI promotes economic growth by enhancing human capital, the most important factor in Research and Development efforts, while Grossman and Helpman (1991) demonstrate that increasing competition and innovation will result in technological advancement and boost efficiency, thereby promoting long-term economic growth.

From the analyses produced under this theory, it can be found that the theory proposes a stronger connection between the FDI and economic growth of the developing countries.

2.3 Empirical review

2.3.1 Empirical study on external debt and economic growth

Moga et al. (2016) used time series information from 1971-2011 to investigate the effect of external debt and Foreign Direct Investment (FDI) on economic growth in Tanzania. The empirical analysis was centred on the Autoregressive Distributive Lag (ARDL) model and the co-integration Bounds Test Strategy as advocated by Pesaran et al. (2001), to test for a long-run equilibrium relationship. The findings indicate that long-running debt promotes economic growth in Tanzania. This finding was, however, contradicted by research conducted by Bolanle et al. (2015), who explored the significant economic impact of external debt and foreign direct investment on Nigeria's growth over a period from 1990 to 2013, using the Error Correction Model (ECM) approach. Their findings indicated that external debt is negatively but insignificantly linked to economic growth.

Farhana and Chowdhury (2014) employed the ARDL model to investigate the link between Bangladesh's foreign debt and economic growth from 1972 to 2010. The research disclosed that foreign debt has an important and inverse connection with economic growth.

Zouhaier and Fatma (2014) assessed the impact of debt on 19 emerging economies from 1990 to 2011 by implementing a dynamic panel data model. The findings showed that the proportion of total external debt to gross domestic product and external debt as a percentage of gross national income, interacts negatively with economic growth.

Ejigayehu (2013), using data from Africa for eight Highly Indebted Poor Countries (HIPC) in Africa between 1991 and 2010, explored whether external debt impacts on economic growth through debt crowding-out or debt overhang. The estimates stated that the impact of debt crowding-out rather than debt overhang affects economic growth.

Aminu, Ahmadu and Salihu (2013) used the Ordinary Least Square (OLS) technique and the Granger Causality Test to investigate the effect of external and internal (domestic) debts on the Nigerian economy from 1970 to 2010. The findings of the OLS showed that external debt is unfavorable to the economy, while internal debt is favorable; the causality test revealed a two-way causality among external debt and economic growth and no causality among internal debt and economic growth.

Osuji and Ozurumba (2013) examined the impact of external debt financing on economic growth in Nigeria between 1969 and 2011. Using the Vector Error Correction Model (VECM) method, the research discovered that London Club debt is directly linked to economic growth, while Paris Club, Multilateral Club, and Promissory debt are inversely linked.

Azam, Emirullah, Prabhakar, and Khan (2013) investigated whether the external debt is a relief or a constraint on the Indonesian economy. The OLS technique revealed that external debt has an adverse impact on economic growth, thus confirming external debt as a liability.

Yagoob and Zhengming (2013) developed an error correction model to determine the impact of the sustainability of external debt on Sudanese

development and discovered indices of sustainability of external debt to substantially impact on economic growth. Similarly, Sulaiman and Azeez (2012) created an error correction model to study the result of external debt on Nigeria's economic growth between 1970 and 2010, and it was found that external debt induces economic growth. Ajayi and Oke (2012), using OLS regression, evaluated the impact of the external debt burden on the Nigerian economy. The outcome of the regression suggested that the external debt burden had a negative impact on national income, which measured economic growth.

Atique and Malik (2012) performed a comparative study to determine the impacts of national debt and external debt on Pakistan's development from 1980 to 2010. For the period under review, it was noted that both types of debt had a substantial negative impact on economic growth; however, external debt had a higher adverse effect. Ogunmuyiwa (2011) set out to verify whether Nigeria's external debt has driven economic growth between 1970 and 2007. It was revealed that external debt has failed to fuel economic growth because there is no causality between external debt and economic growth.

Through panel data analysis, Pattillo, Poirson and Ricci (2002) assessed the non-linear effect of external debt on the growth of 93 developing countries from 1969 to 1998. The research discovered that elevated debt reduces growth by decreasing investment effectiveness rather than quantity.

2.3.2 Empirical studies on FDI and economic growth

Bolanle et al. (2015) explored the substantial economic impact of foreign debt and Foreign Direct Investment on Nigeria's growth over a period from 1990 to 2013 using the Error Correction Model (ECM) method. The results indicated that foreign direct investment is detrimental but substantially linked to economic growth. The research by Muhammad and Ijirshar (2015) is contrary to the results of Moga et al. (2016) and Bolanle et al. (2015).

Muhammad and Ijirshar (2015) examined the impact of Foreign Direct Investment (FDI) on Nigeria's economic growth from 1970 to 2013. The study used the Error Correction Model (ECM) for empirical analysis. The outcome showed that in both the short- and the long-term, FDI had a positive but statistically insignificant connection with economic growth in Nigeria.

Furthermore, Melnyk et al. (2014) explored the effect of foreign investment on the development of 26 post-communism transition economies from 1998 to 2010, and proposed that FDI influenced the growth of these countries. Al Khathlan (2014) used the method of co-integration to explore the long-term connection between FDI inflows and economic growth in Saudi Arabia from 1980 to 2010. He discovered an important beneficial interaction between FDI inflows and economic growth.

On the contrary, research by Saqib, Masnoon and Rafique (2013) on the effect of Foreign Direct Investment on Pakistan's economic growth, shows that Pakistan's economic performance is negatively influenced by foreign investment, while its national investment has benefited its economy. Therefore, it can be asserted that national investment would benefit the economy of the country, and the dependence on foreign investment should stay restricted. In this respect, it seems that most of the advantages of foreign investment are diluted by repatriating profits back to the investor nation. This can also be clarified by the host country's restricted ability to disseminate knowledge and technology transfer for further growth.

Onyeagu and Okeiyika (2013) investigated the connection between FDI, human capital and economic growth in Nigeria and the long-term sustainability of FDI-driven growth. The findings showed that FDI has an inverse and significant long-term impact on growth. Behname (2012) tested for the impact FDI has on the development of the Southern Asian economy between 1977 and 2009, noting that FDI is statistically important and positively linked with economic growth. Umoh, Jacob and Chuku (2012) studied the relationship between FDI and economic growth in Nigeria from 1970 to 2008. The research showed interdependent relationships and positive feedback from FDI to growth and *vice versa*.

Kotrajaras, Tubtimtong, and Wiboonchutikula (2011), using both panel data analysis and co-integration techniques, investigated the effect of FDI on the growth of 15 East Asian economies. Their findings proposed that FDI's beneficial effects on these countries depend on variables such as levels of economic and institutional development, stronger governance and sound macro-economic policies.

In another study, Osinubi and Amaghionyeodiwe (2010) investigated the pattern and significance of the impact of foreign private investment on Nigerian economic growth from 1970 to 2005. It emerged that foreign private investment is statistically important and directly linked to economic growth.

Khaliq and Noy (2007) used sectoral information to analyse the effect of FDI inflows to Indonesia over the era 1997-2006. The combined-level analysis disclosed that FDI had a direct relationship on economic growth.

Regional information from 1992 to 2004 was used by Zhang (2006) to determine the level to which FDI inflows influence China's revenue growth. The estimates of the panel data proposed that FDI improves income growth and that the positive effect of FDI rises over time in the coastal areas compared to the inland areas. Li and Liu (2005) evaluated the relationship between FDI and economic growth through the application of single and simultaneous equation systems on the basis of a panel of 84 countries. The research expressed that FDI directly and indirectly improves economic growth.

2.4 FDI, foreign debt and domestic investment interactions

Neumann (2003) put forth distinct reasoning for domestic investment and FDI interaction by incorporating global debt. She argues that domestic investors cannot, without cost, credibly disclose the amount of first-period investment to global creditors due to information asymmetry. Thus, they choose to incur the cost of self-monitoring to boost capital flows. To this end, they may sell some ownership to foreign investors as an option to

global borrowing. Once equity claims transmit data, equity trading is preferred to foreign borrowing.

In conjunction with this, national investment is crowded by FDI, portfolio investment and foreign debt. However, a domestic investment with FDI and portfolio equity financing is higher in its impact than if it is funded by global borrowing.

2.5 Summary and gap in the literature

In sum, based on empirical review, it can be seen that studies on external debt and FDI seem to be scarce in the literature. Although studies on external debt and economic growth on the one hand, and FDI and economic growth, on the other hand, have been carried out extensively as reviewed in this study, the existing studies produce a conflicting result.

3. RESEARCH METHODOLOGY

3.1 Theoretical framework

Having examined other theories in the literature review, the theoretical framework of analysis adopted in this study is the Debt Overhang Theory. This is because it discusses extensively the subject matter of this research work, which examines the existing relationship among external debt, Foreign Direct Investment (FDI) and economic growth. As mentioned in the theoretical review, external borrowing is overwhelmed by the perceived adverse connection between foreign debt and investment, resulting in reduced capital formation that impacts economic growth. Krugman (1988) has described this adverse connection as debt overhang, where the repayment potential of excellent facilities falls below the signed value. The research provided a straightforward definition of the debt overhang issue as the expected present value of any prospective resource allocation that is not up to its outstanding loan. Several academics endorsed the theoretical case for debt overhang.

3.2 Model specification

To summarise the dynamic interactions of macroeconomic variables, the Vector Autoregressive (VAR) is used. A VAR is an n-equation, n-variable model in which each variable is, in turn, explained by its own lagged values, plus current and past values of the remaining n-1 variable. It is also the reduced form of a dynamic economic system involving a vector of variable Z_t.

$$Az_t = b_1 z_{t-1} + b_2 z_{t-2} + \ldots\ldots\ldots + b_p z_{t-p} + u_t \quad \ldots\ldots\ldots\ldots (1)$$

$$Z_t = (exd, fdi, gdp) \text{ and } u_t = \sum e_t \quad \ldots\ldots\ldots\ldots (2)$$

where

$$\alpha_1, \alpha_2 \ldots\ldots \alpha_p$$

are the coefficient of external debt, FDI and economic growth.

Therefore, z_t can be expressed as thus

$$exd_t = \alpha_1 exd_{t-1} + \alpha_2 fdi_{t-1} + \alpha_3 gdp_{t-1} + e_{1t} \quad \ldots\ldots\ldots\ldots (3)$$

$$fdi_t = \alpha_4 fdi_{t-1} + \alpha_5 exd_{t-1} + \alpha_6 gdp_{t-1} + e_{2t} \quad \ldots\ldots\ldots\ldots (4)$$

$$gdp_t = \alpha_7 gdp_{t-1} + \alpha_8 fdi_{t-1} + \alpha_9 exd_{t-1} + e_{3t} \quad \ldots\ldots\ldots\ldots (5)$$

Therefore, equation 3 to 5 will be estimated in obtaining the dynamic effect that exists among external debt, FDI and economic growth.

Where ***gdp*** *= real gross domestic product,* ***exd*** = external debt, ***fdi*** = Foreign Direct Investment

We see, therefore, that the impulse response functions are employed to obtain the interactive effect among external debt, Foreign Direct Investment and economic growth, given equations 3 to 5.

Impulse responses trace out the response of current and future values of each of the variables to a one-unit increase in the current values of one of the VAR errors. The study observed that:

$$Z_t = A^{-1}\beta r_{t-1} + A^{-1}\mu_t \quad (6)$$

The impulse response function (IRF) of a unit shock of u can be calculated if A^{-1} is known and the system has been in steady state for a while. Tracing the dynamics of a shock to the first variable in the VAR model, when a shock hits time 0.

3.2.1 Estimation technique

In order to obtain objective results in the investigation of the interactive effects among external debt, Foreign Direct Investment and economic growth, impulse responses were used through the application of the VAR model. To meet the second objective, which is to investigate the causal relationship among external debt, foreign direct investment and economic growth, the Granger Causality Test was employed. The section starts with examining the time series property of the variables that were included in the model in order to avoid the occurrence of spurious regression.

Determining the order of integration of the variables involved subjecting the data series to a unit root testing by conducting the Augmented Dickey-Fuller (ADF). After ascertaining the order of integration, the Johansen co-integration analysis was carried out in order to test for the existence of a co-integrating vector among the variables.

4. EMPIRICAL ANALYSIS

4.1 Stationarity test using Augmented Dickey-Fuller Test

Table 1: Stationarity test - Augmented Dickey-Fuller

SERIES	LEVELS	FIRST DIFFERENCE	REMARK
Log (EXDT)	-2.5267	-4.7807	*I(1)*
Log (FDI)	-0.977	-10.8632	*I(1)*
Log (RGDP)	0.6485	-5.3078	*I(1)*
Critical Value at 5% = 2.99			

Evidence from Table 1 reveals that all the variables were not stationary at a given level and at different equation specifications, whether with both intercept and trend or with intercept only.

4.2 Co-integration analysis

Since all the variables have their time series to be stationary at the first difference of their respective data, we computed a co-integration test using the Johansen Co-integration test with a lag. This is presented in Table 2:

Table 2: Co-integration test

Hypothesised No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None	0.359546	23.48720	29.79707	0.2230
At most 1	0.214982	8.783110	15.49471	0.3858
At most 2	0.023818	0.795518	3.841466	0.3724

Trace and Max-Eigenvalue indicates no cointegrating equations at the 0.05 level

The result of the co-integration test in Table 2 confirmed that there is no co-integration relationship among the macro-economic variables in the model. The study therefore proceeded to meet objective one: the interactive effect among external debt (EXDT), Foreign Direct Investment (FDI) and Economic growth (RGDP), using the impulse response approach and forecast error decomposition by estimating the VAR models stated in equations 3-5. The next step was to meet objective two by estimating the Granger causality in equations 3-5.

4.3 Interpretation of impulse response analysis

From Figure 1, one standard deviation was calculated in percentage form for each of the variables. The horizontal axis of the impulse response function (IRF) showed the number of periods that had passed after the impulse was given, while the vertical axis measured the responses of the variables.

Panel (a) shows the innovation of economic growth and how it affects itself. The result shows a static flow for the result of 0.22, 0.22, 0.22, 0.23, 0.23, 0.23, 0.24 and 0.24 percent in the first, fifth, tenth, fifteenth, twentieth, twenty-fifth, thirtieth and thirty-fifth period, respectively.

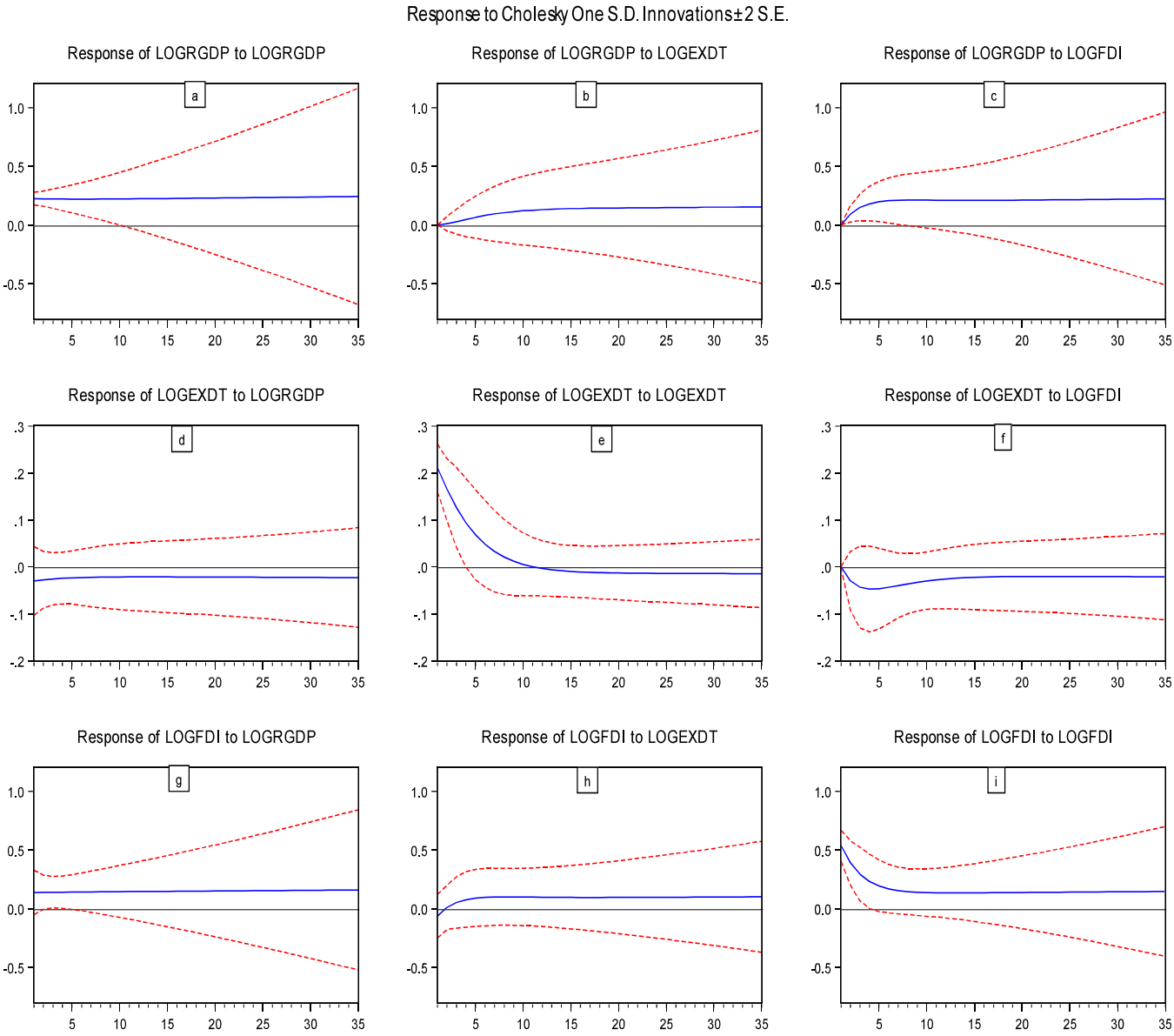

Figure 1: Impulse Response Functions

Panel (b) shows a steady positive flow of economic growth due to shocks in external debt from the neutral effect of 0.00 in the initial period to 0.06, 0.12, 0.14, 0.15, 0.15, 0.15, and 0.15 percent in the fifth, tenth, fifteenth, twentieth, twenty-fifth, thirtieth and thirty-fifth period, respectively. This is contrary to the response of external debt to innovations in economic growth in **Panel (d),** which shows a static negative movement of -0.02 percent throughout all the periods.

The innovation of Foreign Direct Investment affects economic growth positively as evident in P**anel (c),** that started with a neutral response in period one, and then increased to 0.18 in the fifth period, while the tenth, fifteenth and twentieth period had an equal response of 0.21 percent, which finally moved to 0.22 over the remaining periods.

This is no difference from the result shown in **Panel (g),** with a positive response of Foreign Direct Investment to innovations in economic growth and 0.14 percent in the initial and fifth period, 0.15 in the tenth, the fifteenth, twentieth and twenty-fifth period, while the thirtieth and thirty-fifth periods had 0.16 percent.

From **Panel (h)**, a shock to external debt produced a continuous and steady positive response by Foreign Direct Investment of 0.06 percent in the initial period to 0.10 percent as a fixed response over time in the fifth, tenth, fifteenth, twentieth, twenty-fifth, thirtieth to thirty-fifth periods. However, a contrary result was observed in **Panel (f),** which shows a continuous and steady negative response of external debt to innovations in Foreign Direct Investment over time**. Panel (i)** shows a positive response of innovation in Foreign Direct Investment to itself over time.

4.4 Forecast Error Variance decomposition

Impulse response functions are very useful in ascertaining the direction of effect of a shock to innovation of a variable, while the magnitude of the effect of a shock to innovation can only be deciphered by forecast error variance decompositions (Akinlo, 2004).

Evidence from Figure 1 or **Panel (i)** shows that the shocks explained a large proportion of the variations in economic growth. The magnitude at which economic growth decreased was from a high value of 100 in the initial period to 69.3 in the fifth period; they continued to decrease rapidly over the periods. External debt explained a neutral proportion of variations in the variance of economic growth, which increased gradually from 0.00 percent in the initial period to 1.98, 6.92, 10.4, 12.4, 13.7, 14.5, 15.1 in the

fifth, tenth, fifteenth, twentieth, twenty-fifth, thirtieth and thirty-fifth period, respectively. Also, a neutral effect of 0.00 was observed at the initial stage by Foreign Direct Investment, followed by a gradual increase rise over time.

Table 3 **(Panel ii)** shows the proportion and magnitude of variance decomposition in external debt by shocks in the two considered endogenous variables, which are very critical to the determining of the variation in the variance of external debt. However, economic growth magnitude was 2.02 per cent in the initial period and increased steadily over time. The shocks by external debt and the variation in itself were very high in the initial period, with a value of 98 percent which reduced gradually to 90.4, 84, 80.6, 78.1, 75.6, 73.5 and 71.3 percent in the fifth, tenth, fifteenth, twentieth, twenty-fifth, thirtieth and thirty-fifth periods, respectively. The variation in external debt as a result of shocks in Foreign Direct Investment was neutral at the initial period to 1.2 percent in the fifth period and it increased gradually to 16.8 percent in the thirty-fifth period.

Table 3: Variance decomposition of *LOGGDP (Panel i)*

Period	S.E.	LOGGDP	LOGEXD	LOGFDI
1	0.224990	100	0	0
5	0.597935	69.25001	1.977519	28.77247
10	0.938182	56.01212	6.924577	37.06330
15	1.201659	51.59294	10.40456	38.00251
20	1.424979	49.53420	12.44518	38.02062
25	1.624461	48.36332	13.68531	37.95137
30	1.808229	47.60977	14.49708	37.89316
35	1.980887	47.08439	15.06523	37.85038

Variance decomposition of *LOGEXD (Panel ii)*

Period	S.E.	LOGGDP	LOGEXD	LOGFDI
1	0.213463	2.018091	97.98191	0
5	0.334879	3.125466	90.42025	6.454281
10	0.354075	4.728531	84.04379	11.22768
15	0.361852	6.281968	80.64363	13.07440
20	0.369112	7.757253	78.05617	14.18658
25	0.376435	9.168658	75.71251	15.11883
30	0.383870	10.52188	73.49058	15.98754
35	1.391429	11.81992	71.36372	16.81636

Variance decomposition of LOGFDI *(Panel iii)*

Period	S.E.	LOGGDP	LOGEXD	LOGFDI
1	0.558154	6.102946	92.55839	1.338662
5	0.858172	13.22995	83.91094	2.859106
10	1.000231	20.05032	72.92479	7.024885
15	1.116582	24.73541	65.84311	9.421481
20	1.224364	28.04309	61.04679	10.91012
25	1.326819	30.47974	57.55958	11.96068
30	1.425314	32.34509	54.89876	12.75615
35	1.520744	33.81776	52.79958	13.38266

Depicted in Table 3 (**Panel iii**), the shocks in economic growth cause Foreign Direct Investment to be decomposed by 6.4 percent in the initial period with gradual increase over time to 13.22, 20.1, 24.7, 28.04, 30.5, 32.3 and 33.8 percent in the fifth, tenth, fifteenth, twentieth, twenty-fifth,

thirtieth and thirty-fifth periods, respectively. The external debt caused it to decompose by 1.33 percent in the initial period and it continued to increase at a gradual and steady rate over time. The shocks in Foreign Direct Investment and the variation in itself were very high in the initial period, with a value of 92.6 percent, but they began to reduce gradually over the periods as it got to 52.8 percent in the thirty-fifth period.

Table 4: Causal Relationship among External debt, Foreign Direct Investment and Economic Growth

	F- statistics	**P- value**	**Remark**
LOGFDI →LOGGDP	10.452	0.0029	Causality
LOGGDP →LOGFDI	0.7221	0.4019	No causality
LOGEXD →LOGGDP	2.5911	0.1173	No causality
LOGGDP →LOGEXD	0.9255	0.3432	No causality
LOGEXD →LOGFDI	0.1201	0.7312	No causality
LOGFDI →LOGEXD	1.8821	0.1834	No causality

Table 4 shows that causation only exists between Foreign Direct Investment and Economic growth, running from FDI to Economic growth at a 5% level of significance. This implies that an increase in Foreign Direct Investment could cause economic growth, according to the Granger Causality Test.

5. CONCLUSIONS AND RECOMMENDATIONS

As revealed from the findings, there exists a positive relationship between economic growth and Foreign Direct Investment, while there is a negative relationship between external debt and both Economic growth and Foreign Direct Investment. Also, the Granger Causality test revealed that only Foreign Direct Investment causes economic growth. These findings show

that Foreign Direct Investment is a better source of stimulating economic growth, a realisation appreciated by most countries of the world.

Therefore, the following are recommendations for the Nigerian economy are made:

- Judicious utilisation of borrowed fund for productive investment, in order to increase the rate of economic growth and hence increase the rate of Foreign Direct Investment.
- Sourcing alternative means of financing its deficit rather than engaging in external borrowing that could distort or impact negatively on the economic growth.
- Depleting the existing external debt stock, in order to avert the problem of debt overhang, which has serious implications on the economy.
- Improving the economic condition of the Nigerian business environment, in order to attract foreign investors that could stimulate economic growth.

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