Foreign Direct Investment-Trade Nexus in Nigeria: Do Structural Breaks Matter?

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Abstract

In this paper, three innovations are introduced to the literature on the Foreign Direct Investment (FDI)-trade nexus: identification and consideration of structural breaks in the underlying time series data; use of disaggregated data set that captures the oil and non-oil dichotomy of the Nigerian economy; and introduction of identified break in the short-run model. We found the existence of a co-integrating relationship between the variables amidst observed breaks in 1980 and 1992. Thus, considering structural breaks in estimations cannot be downplayed as ignoring this may yield biased and inconsistent estimates. Findings revealed a one-way causal linkage between non-oil imports and oil exports to oil FDI with no reverse causality observed, while non-oil FDI was found to Granger cause non-oil exports. The results made a case for further diversification of trade in a bid to dampen the effects of exogenous shocks as well as gearing more efforts towards the provision of an enabling environment, particularly in the non-oil sector to spur direct investments.

Keywords: Foreign direct investment, trade, structural breaks, oil, non-oil, causality

JEL Classification Numbers:C30, F14, F21, Q40

I. Introduction

Foreign direct investments (FDI) and trade are critical components of development and their relationship has continued to attract attention. Specifically, the question as to whether they are complements or substitutes, particularly in view of structural changes, has been given little or no attention in the literature. It is against this background that this study seeks to peruse this linkage in

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Nigeria, an oil-dependent economy, vulnerable to the global crude oil market that makes it susceptible to sudden shocks through the finance and trade channels.

Unprecedented growth of international trade flows over the last decades has been matched by a no less dramatic surge in the activities of Multinational Enterprises (MNEs) and a common measure of such activity is FDI (Bowen, Hollander and Viaene, 1998). The growing importance of FDI is reflected in the values of international production, which has witnessed significant expansion in the last two decades and is presently of considerable importance in the world economy (Forte, 2004). Quite a number of studies have examined this crucial relationship and the dominant argument is that larger flow of FDIs stimulates increased volume of trade as well as other benefits such as high rates of total factor productivity and output growth. Aizenman and Noy (2005), for example, found a strong feedback effect between FDI and manufacturing trade, while Fontagne and Freudenberg (1999) opined that until the mid1980s, international trade generated FDIs, but after this period, the cause and effect linkage seems to have reversed with FDI heavily influencing trade.

Nevertheless, studies have shown that international trade and FDIs are complements rather than substitutes if trade between two countries is based on comparative advantage (Chaisrisawatsuk and Chaisrisawatsuk, 2007). It follows therefore to expect that the relationship between FDI and trade will be bi-directional, but it is less evident whether the impact of trade on FDI should be different for a resource-dependent economy and, the nature of the relationship if structural breaks are taken into account.

Few studies have examined jointly the causal links between FDI and trade, particularly in view of the oil and non-oil dichotomy, which exemplifies the structure of the Nigerian economy. Studies that distinguished between oil and non-oil FDI, as well as oil and non-oil exports and imports are scarce. In addition, such empirical exercises are sparsely considered, if ever carried out in Nigeria's context. In this study, an attempt is made to bridge these gaps by investigating the causal links between oil and non-oil components of FDI, as well as exports and imports in Nigeria. The methodology relies on Granger non-causality testing, predicated on a modified Wald (MWALD) Vector Autoregression (VAR) based model, where all the variables, including the identified break points are treated as endogenous. Its potency lies in its ability to identify both direct and indirect causalities between the variables considered.

The rest of the paper is organised as follows: Section 2 presents a synoptic background to the study, while Section 3 reviews the theoretical and empirical links between FDI and trade. Section 4 provides an exposition of the methodology and Section 5 discusses the results. Section 6 concludes the paper with some policy implications.

II. Stylised Facts

This section presented stylised facts on the evolution of FDI, import and export (Total trade) in Nigeria between 1960 and 2010. The trends of the highlighted macroeconomic variables were cautiously examined and discussed. Table(s) and pictorial representations of the data were used to reinforce the observed patterns. Descriptive approach was used in this section.

Table 1: Average FDI and Trade Flows for Oil and Non-Oil in Nigeria: 1960-2010 (₦ million)

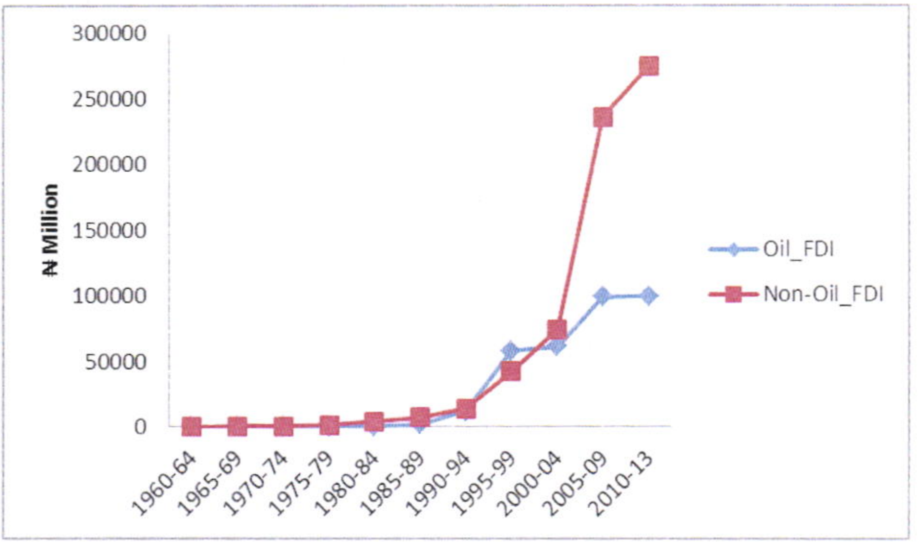
		FDI		Import	Export		Total Trade	
Year	Oil	Non-Oil	Oil	Non-Oil	Oil	Non-Oil	Oil	Non-Oil
1960-64	136.65	290.57	35.05	406.12	34.16	332.19	69.21	738.31
1965-69	422.12	444.5	35.11	442.22	160.17	369.57	195.28	811.80
1970-74	762.5	690.18	45.54	1111.96	1979.60	357.69	2025.15	1469.65
1975-79	771.48	1695.24	131.04	6198.54	6705.18	536.52	6836.22	6735.06
1980-84	678.28	4023.52	205.34	9552.2	9671.56	329.82	9876.9	9882.02
1985-89	1910.86	7264.02	2522.1	14120.66	26250.6	1782.6	28772.7	15903.26
1990-94	12213.14	14253.68	23378.5	97976.6	167871.5	4501	191250	102477.6
1995-99	58317.38	42577.6	174484.6	598196.4	1062709	25830	1237193	624026.4
2000-04	61577.9	74597.34	307334.3	1277301	2578575	71129.83	2885909	1348431
2005-09	99222.7	235771.9	945296.6	3077436	8084610	195160.1	9029906	3272597
2010-13	99993.43	274326	2311220.87	5719946.9	12287803.17	455194.21	14599024.04	6175141.11

Source: *CBN, 2011.*

Table 1 showed the level of FDI, import, export and total trade in the oil and non-oil sectors from 1960 to 2013. It is evident from the table that all the macroeconomic variables considered trended upward. Some of what could be responsible for the upward trend included: the prevailing economic conditions; bilateral relations and trade agreements; exploration of crude oil in commercial quantities that led to the influx of multinational companies; huge increases in oil-based exports; and global economic condition, among other reasons.

Oil FDI increased progressively all through the study period. On the contrary, non-oil FDI increased moderately until the period 2000-2004 when there was substantial jump from ₦74.6 billion to ₦235.8 billion in the period 2005-09. Thereafter, non-oil FDI was relatively stable, although marginal increase was observed in the period 2010-2013 when it increased to ₦274.3 billion. Evolution of oil and non-oil FDI from 1960 to 2013 is illustrated in Figure 1.

Figure 1: Average Oil and Non-Oil FDI: 1960-2013

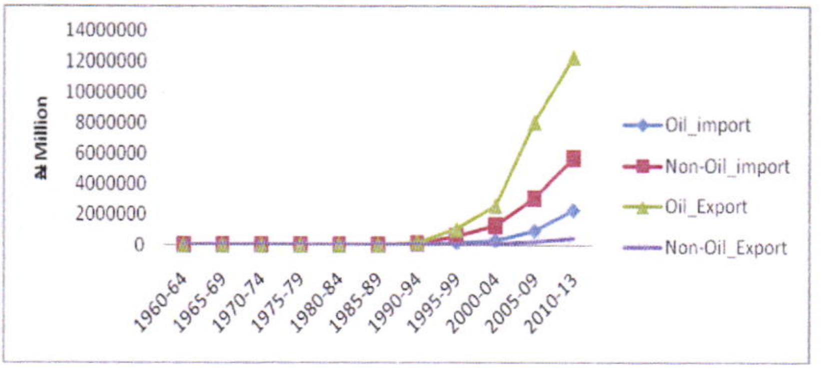


Source: *CBN Statistical Bulletin, 2011.*

Oil import increased marginally from 1960 to 1984, but substantial increases were observed thereafter. For the period 1960-1964, non-oil FDI stood at ₦35.05 million, which was about the lowest during the period considered, but gradually rose to ₦205.34 million in the period 1980-1984. The increase was more than ten-fold in the period 1985-89 (₦2552.1 million) in relation to the preceding period. The geometric increase in import persisted in the period 2010-13. Non-oil Import assumed similar trend with oil import, only that the slope of the trend of non-oil import was conspicuously steeper from the period 1990-94 relative to oil import in the same period (see Figure 2).

As depicted in Figure 2, there was no striking difference between the volume of oil and non-oil export until the period 1995-99, when oil export rose precipitously above its counterpart. Oil export rose from ₦34.16 million in the period 1960-64 to ₦9671.56 million in the period 1980-84. Thereafter, it rose from ₦26250.6 million in the period 1985-89 to the peak of ₦112.3 trillion in 2010. On the contrary, non-oil export was ₦332.19 million in the period 1960-1964 and reached ₦536.32 million in the period 1975-79. There was decline in volume of non-oil export in the period 1980-84 relative to the preceding period. However, the trend consistently increased from the period 1985 to 1989 through the period 2010-13, but the rate of increase in non-oil export was smaller relative to oil export.

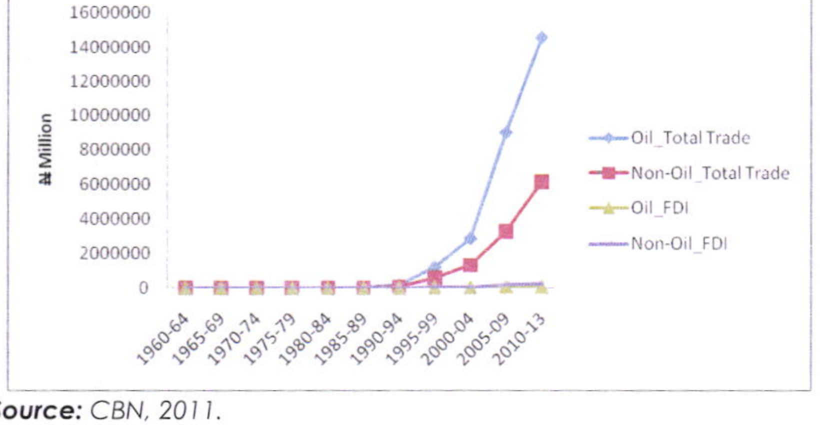
Figure 2: Average Oil and Non-Oil for Import and Export: 1960-2013



Source: CBN, 2011.

Total oil trade persistently increased all through the study period, ranging between ₦69.21 million and N14.6 trillion (oil) as well as ₦738.31million and ₦6.2 trillion (non-oil) in the periods 1960-64 and 2010-13, respectively. One striking feature of the evolution of total trade is that the rate of growth and volume of oil significantly increased faster than that of the non-oil, especially in the 1970s when oil took over from agriculture as the mainstay of the economy. A comparative analysis of the evolution of FDI and total trade for both categories (oil and non-oil) showed that the slopes of oil and non-oil total trade were significantly steeper than that of the FDI for both classes, especially from the period 1990 to 1994 (see Figure 3). This cursory observation suggested that there is divergence among the patterns of FDI and trade in Nigeria, reinforcing the need to empirically validate the nature of the relationships that exist between the duo (FDI and total trade).

Figure 3: Average Oil and Non-Oil for FDI and Total Trade: 1960-2010



Source: *CBN, 2011.*

III. Literature Review and Theoretical Framework

The international trade literature makes provision for the relationship between FDI and exports. Mundell (1957), using the H-O-S (Heckscher-Ohlin-Samuelson) model demonstrated that the difference in comparative advantage is the basis of trade. Neutralising the assumption of factor mobility, trade between two countries takes place to a level at which factor price tends to equalize in both countries, in absolute as well as in relative terms. However, once capital is allowed to move freely across the countries, i.e., from the capital-abundant to capital-scarce country, the difference in factor prices are reduced, while the difference in comparative cost will diminish. Hence, trade will decline and will be substituted completely by FDI. Evidently, the conclusion that both trade in goods and factors are substitutes is derived from the H-O factor endowment theory, which assumes perfectly competitive markets, identical constant returns to scale production function and the absence of transportation cost.

On the other hand, the complementary relationship between FDI and trade is exemplified by the Flying Geese model introduced in the early 1960s. The model assumes that Multinational Enterprises (MNEs) relocate production based on cost of labour inputs to reduce production cost and maintain competitiveness. Using the host country's abundant factor, the MNEs increase the export supply capacity of the host country and bring in new technology, capital equipment, and managerial expertise as well. Vernon (1966), Product Life Cycle (PLC) hypothesis also explained a positive role of FDI in promoting exports from host countries. He argued that technology passes through four stages of production, namely innovation, growth, maturity and decline[2].

The proximity concentration hypothesis postulates that greater transaction costs resulting from higher trade barriers and transportation cost, lead to horizontal cross-border production expansion and thus, stimulate international investment. This implies that international trade is more or less a substitute for international investment. The factor proportion hypothesis predicts that international trade and investment are complements as firms take advantage of factor price differences through cross-border vertical production integration.

A pertinent observation from the literature is that the thrust of this linkage has viewed FDI as market seeking, resource seeking or as efficiency seeking (Sadiq and Bolbol, 2001). Nonetheless, it is pertinent to note that there is also a tendency to characterise market- and resource-seeking FDI as trade-diverting, while efficiency-seeking FDI may be viewed as trade-creating given the possibility that FDI to host countries might also

2 This view assumes that FDI comes only in those sectors in which the host country has comparative disadvantage. Such FDIs come only to supply domestic market of host countries and hence plays no role in increasing exports. So FDI replace imports with domestic production.
Applying Vernon model at industry level, Kojima (1973, 1985) found when FDI is made in the sector in which the country of origin has comparative disadvantage and the host country has comparative advantage, then this kind of investment has trade creating effect implying that the host country's export will increase.

service other market(s) (Tadesse and Ryan, 2002). The inclusion of issues such as market size, proximity of the sources of demand and globalisation processes are added, the debate on whether movements in factors create or divert trade becomes increasingly clouded as it adds an additional dimension to the problem: the competitiveness of both the investing; and the host country industries (ibid.).

It, thus, follows that if FDI displaces trade, exports will be at least replaced by domestic sales in foreign markets and this is detrimental to the domestic industry of the investing country. On the contrary, if trade and FDI are complements, investing abroad might lead to greater competitiveness of the foreign market and this is beneficial to exports from the investing country and therefore to its industries. It is therefore important to include as many heterogeneous host nations as possible in the sample, while evaluating the FDI-trade link (Tadesse and Ryan, 2002). While early international trade literature suggest that factor and product movements are substitutes rather than complements (Mundell, 1957), recent theoretical and empirical investigations have failed to support this conclusion. To a large extent, this conclusion seem to differ following the nature of investment (resource-, market-or efficiency-seeking), and host- and home-country relationships (proximity, bilateral and multilateral trade and investment agreements). An important aspect that is missing from the empirical literature is that very few of the studies evaluate the FDI-trade link while simultaneously controlling the geographic, development, and markets servicing (mainly host, regional, home or non-regional markets) diversity of the host nations.

Waheed and Jawaid (2010) investigated the impact of inward foreign direct investment (FDI) on aggregate imports in Pakistan using the annual time series data for the period, 1981 to 2007. Their results suggested the existence of a significant long-run equilibrium relationship between inward FDI and aggregate imports in Pakistan, while the parsimonious short-term dynamic error-correction model confirmed a significant positive short-run relationship with high speed of adjustment. The causality result showed unidirectional causality running from inward FDI to aggregate imports in the country. The sensitivity analysis carried out in the study confirmed the robustness of the results.

Fontagne and Pajot (1997) demonstrated why and how much trade and FDI are complements at the macroeconomic level. They argued that spillovers between firms, within industries, and between industries, within the manufacturing sector, are a key issue and that biased estimates when models do not control for the fact that competitive industries export and invest more abroad are also an important concern. They took into cognizance these pertinent issues in their study and concluded that investing abroad improved the competitiveness of French industries. In the case of the US, they found that outward FDI flows complement trade flows whereas investing abroad was detrimental to the sectoral trade balance, or at best only slightly beneficial, depending on the combination of specific effects. They concluded that inward FDI is detrimental to the trade balance in the industries considered in both US and France.

Tadesse and Ryan (2002) examined the extent to which the FDI-trade nexus was influenced by host-country heterogeneities associated with the development (income) and market servicing roles of Japanese FDI host countries. Using the counts and values of Japanese aggregate FDI and trade flows into more than 100 geographically and developmentally diverse countries, they showed that Japanese FDI in the 1990s was generally trade creating. However, the extent to which FDI complemented trade varied by geographic, developmental and market servicing status of the host countries. Their findings also indicated that higher factor costs and exchange rate volatility lowered the occurrence and value of Japanese FDI and observed that Japanese FDI was mostly tariff jumping.

Aminian, Fung and Ilzaca (2007) examined the trend and nature of East Asian trade as well as ascertained the role of FDI in import and export behaviour of East-Asian intra-regional trade. They opined that the increased importance of East Asia as a trading region was due partially to the rising trade in components and parts. Premised on a gravity model, their analysis revealed that in general, FDI was important in explaining imports and exports of intra-East Asian trade and in particular, FDI was especially important in explaining trade in components and parts, followed by trade in capital goods. Their finding lent support to the fact that FDI and trade associated with production fragmentation in East Asia is complementary.

Abdel-Rahman (2007) used both multivariate granger causality and Johansen cointegration to examine the relationship between foreign investment and international trade in Bangladesh in the period 1972 to 2007. The results revealed that a long-run relationship existed between export, imports and FDI, but found that FDI Granger-caused imports and not exports, and contrary to expectations trade did not granger cause FDI.

Chaisrisawatsuk and Chaisrisawatsuk(2007) investigated bi-directional effects between international trade and investment using data from 26 Organisation for the Economic Cooperation and Development (OECD) and 6 Association of the Southeast Asian Nations (ASEAN) countries. They found that exports or imports were complementary with FDI inflows. The study identified trade facilitation as a key factor to induce FDI inflows to the host country from the home country. Bilateral FDI inflows were observed to have feedback effect on exports of not only the home and host countries, but also on those of other trading partners. Similar linkages between bilateral FDI inflows and imports were also observed.

Bezuidenhout and Naude (2008) investigated the relationship between trade and FDI for the Southern African Development Community (SADC) members and the countries which could potentially be SADC members for the period 1973-2004. Using the modified gravity model and panel methods of estimations, they found a positive relationship between exports and FDI. Political instability and distance were found to negatively influence FDI in SADC. Their results revealed differences in the patterns and determinants of FDI to SADC whether it was from the USA and UK or from Europe. Furthermore, they found a complementary relationship between FDI and trade to SADC in the case of Europe. The results were similar to that of Chaisrisawatsuket al. (2007).

Sultan (2013) examined the nature of relationship between export and FDI in India over the period, 1980 to 2010. He relied on Johansen co-integration method and found the existence of a stable long-run equilibrium relationship between FDI and export growth. The result of Granger causality based on vector error correction model (VECM) showed that causality runs from export to FDI inflow direction and not from FDI inflow to export direction. In the short-run, however, neither export Granger-caused FDI inflow nor FDI inflow Granger- caused export from India.

Duong, Anh and Phuong (2012) assessed the linkage between FDI and trade in the case of Vietnam. The authors found that there was a one-way causal linkage between trade and FDI. They also found a two-way causal linkage between import and FDI. Aizenman and Noy (2005) argued that while it is common to expect bi-directional linkages between FDI and trade in goods, it is difficult to indicate whether inflows and outflows of FDI distinctly affect trade in different goods. They found the existence of bidirectional causality from FDI flows to trade openness. Raff (2004) investigated the effect of Free Trade Agreement (FTA) on FDI location selection and its impacts on social welfare. He found that economic integration, through tariff reduction led to greater FDI inflows and invariably led to social welfare improvement.

Okpe and Abu (2009) investigated the effect of foreign private investment on poverty in Nigeria. The study covered the period 1975 to 2003 and employed ordinary least square technique. The analysis carried out demonstrated that the inflow of foreign private investment and foreign loan significantly alleviated poverty in Nigeria. The authors advocated for inflow of foreign private investment as well as infrastructural development, especially in the rural area. Awolusi (2012) investigated the long-and short-run equilibrium relationship among economic growth, FDI, trade and domestic investment in Nigeria for the period, 1970 to 2010. Multivariate cointegration technique and vector error-correction model were employed in the study. The findings affirmed the existence of cointegrated vectors, suggesting the existence of long-run relationship among economic growth, FDI, trade and domestic investment. Further, unidirectional and bidirectional causality were also reported among the employed variables. The study advocated for infrastructural development and enactment of policies that would attract FDI in the service sector, against the resource and market seeking FDI from developed economies.

Ndem et al., (2014) examined the determinants of foreign direct investment and their impact on the Nigerian economy from the period, 1975 to 2010. Ordinary least square, cointegration and error correction techniques were employed. The authors found that market size, openness, investment in infrastructure, and exchange rate positively influenced FDI, while political instability exerted negative influence on FDI. They recommended infrastructural improvement, political stability, enabling social-economic environment and technological improvement through knowledge spill over. Olufemi and Keke (2014) explored the impact of foreign private investment on economic growth in Nigeria. The study employed cointegration and error correction model techniques. The results showed that a substantial proportion of capital inflow were not productive, while political environment significantly eroded some of the productive portion of capital inflow. The authors submitted that the prospect of foreign investment in fast-tracking economic growth is enormous. However, certain conditions such as political and macroeconomic stability were identified to be germane to foreign private investment inflows. The literature on the FDI-Trade nexus is dominated by country- and group of country level studies. Studies in the category of the latter include (Blonigen, 2001 and Liu et al., 2001), while the former include (Nkuna, 2012 and List, 2001).

Although some of the aforementioned FDI-trade link literature showed that trade and FDI are substitutes, others maintained that trade and FDI were complementary. This is particularly true when competition in multiple foreign economies and under imperfect markets and uncertainty are considered (Helpman, 1984 and Markusen and Venables, 1998) and under this scenario, the link often turns out to be complementary. The huge strand of the empirical evidence concurs to the notion that trade and FDI are important modes of internationalisation that complement one another. In this regard, FDI might induce trade (Yamawaki, 1991) or trade might induce FDI (Eaton and Tamura, 1994).

Major issues arise from the empirical literature could be categorised in as follows. First, the use of highly aggregated FDI and trade data make it difficult to capture the precise relationship. Second, the studies ignored the role of structural breaks on the performance of FDI inflows and trade. In the case of the former, studies on the relationship between FDI and trade are generally constrained by data shortages. The few existing related researches carried out for Nigeria have not only offered little guidance on the relationship in the event of structural breaks in the time series at a more disaggregated level, but have not considered the FDI-trade nexus explicitly. For instance, Okpe and Abu (2009) examined the effects of foreign private investment on poverty in Nigeria. The study covered the period, 1975 to 2003 and employed ordinary least square technique. Aside that, structural breaks were not accounted for in the analysis and the focus of the study was not on trade.

Similarly, Ndem et al., (2014) investigated the determinants of foreign direct investment as well as its contributory role to the Nigerian economy. Their analysis, which employed ordinary least square and cointegration error correction techniques, did not account for the relationship in the event of structural breaks in the time series. Olufemi and keke (2014) studied the role of foreign private investment in fostering economic growth in Nigeria, but the role of trade was downplayed in the study and the study did not account for structural breaks. Awolusi (2012) attempted to explore the relationship between FDI and trade in Nigeria. The structural break that was not accounted for as well as the aggregative nature of the data employed to capture economic growth suggested re-examination of the outcome from the study. Therefore, the need for a study that addresses these issues to provide better understanding of this crucial nexus in Nigeria is imperative.

IV. Methodology

IV.1 The Model

We start by positing a linear structure for the causal factors of oil and non-oil FDI inflows in the spirit of Aizenman and Noy (2005), but differ from their specification in that we account for structural changes and the oil and non-oil dichotomy of the Nigerian economy. This results in the following specifications:

$$FDI_t(T) = \alpha + \beta_i X_t(T) + \varepsilon_t \tag{1}$$

Where the regressand $FDI_t(T)$ refers to FDI inflows at time t and type T (oil and non-oil), while $\beta_i X_t(T)$ is a vector of trade variables (oil and non-oil imports and exports). The error term, assumed to be normally distributed with zero mean and constant variance is denoted by ε_t. In line with the theoretical literature, we expect a complementary and/or bi-directional relationship between the variables.

IV.2 Estimation Procedure

Unit Root Test

Prior to the cointegration and causality test, the mean reversion test of the series was carried out using the Zivot-Andrew (Z-A) Unit Root Test. Several studies have found that the conventional unit root tests fail to reject the unit root hypothesis for the series that are actually trend stationary with a structural break (Binh et al., 2010). The regression equations for the Z-A unit root are:

$$y_t = \hat{\mu}^A + \hat{\theta} DU_t(\hat{\lambda}) + \hat{\beta}^A t + \hat{\alpha}^A y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^A \Delta y_{t-j} + \hat{e}_t \quad (2)$$

$$y_t = \hat{\mu}^B + \hat{\beta}^B t + \hat{\gamma}^B DT_t^*(\hat{\lambda}) + \hat{\alpha}^B y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^B \Delta y_{t-j} + \hat{e}_t \quad (3)$$

$$y_t = \hat{\mu}^C + \hat{\theta}^C DU_t(\hat{\lambda}) + \hat{\beta}^C t + \hat{\gamma}^C DT_t^*(\hat{\lambda}) + \hat{\alpha}^C y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^C \Delta y_{t-j} + \hat{e}_t \quad (4)$$

Where $DU_t(\hat{\lambda}) = 1$, if $t > T\lambda$, 0 otherwise; $DT_t^*(\lambda) = t - T\lambda$ 0 otherwise. The hats indicate the estimated values of the break fraction. Zivot and Andrews (1992) unit root test suggested that we reject the null hypothesis of a unit root if computed *t* is less than the left-tail critical *t* value.

Gregory-Hansen (G-H) Co-integration Test

We employed the Gregory and Hansen (1996) tests for cointegration where the structural break is test-determined and the cointegrating vectors are allowed to change at an unknown time period. As earlier noted, this is because in general, failure to account for breaks can produce misleading results leading to incorrect inference. Esso (2010) opined that the cointegration framework of Engle and Granger, and Johansen have limitations, especially when dealing with economic data containing the structural breaks. In this case, we tend to reject the hypothesis of cointegration, albeit one with stable cointegrating parameters. This is because the residuals from the cointegrating regressions capture unaccounted breaks and, thus, typically exhibit non-stationary behavior.

Therefore, it is necessary to employ non-linear techniques for testing cointegration if the series have structural breaks. One of the widely used methods is the Gregory and Hansen (1996) threshold cointegration test. And the test equations (level shift, level shift and trend, and regime shift) are expressed as follows:

3 For comparison, the Augmented Dickey Fuller (ADF) test was conducted.

4 The Engle and Granger cointegration test is also used for comparability purpose.

$$y_{1t} = \mu_1 + \mu_2\varphi_{t\tau} + \alpha^T y_{2t} + e_t \quad (5)$$

$$y_{1t} = \mu_1 + \mu_2\varphi_{t\tau} + \beta t + \alpha^T y_{2t} + e_t \quad (6)$$

$$y_{1t} = \mu_1 + \mu_2\varphi_{t\tau} + \alpha^T y_{2t} + \alpha^T y_{2t}\varphi_{t\tau} + e_t \quad (7)$$

Where y is the observed data and μ_1 and μ_2 represent the intercept before the shift and the change in the intercept at the time of the shift; φ is the dummy variable that captures structural change; β is the trend slope before the shift; is the slope coefficients and are assumed to be constant. Y_{1t} represents the dependent variable, while Y_{2t} is a vector of independent variable(s). The standard method to test the null hypothesis of no cointegration is residual-based and is obtained when equations (5, 6 and 7) are estimated using the ordinary least square (OLS) and the unit root tests are applied to the regression errors (Gregory and Hansen, 1996).

Toda-Yamamoto (T-Y) Granger Causality Test

This paper made use of the T-Y Granger non-causality technique to examine the causal relationship between FDI and trade. As pointed out by Clarke and Mirza (2006), unit root and cointegration might suffer from size distortions, which often imply the use of an inaccurate model for the non-causality test. To obviate some of these problems, based on augmented VAR modelling, T-Y introduced a Wald test statistic that asymptotically has a chi square ($\chi 2$) distribution irrespective of the order of integration or cointegration properties of the variables. The T-Y approach fits a standard VAR model on levels of the variables and therefore makes allowance for the long-run information often ignored in systems that require first differencing and pre-whitening (Clarke and Mirza, 2006).

The approach employs a modified Wald test for restrictions on the parameters of the VAR (k) where k is the lag length of the system. The basic idea of the T-Y approach is to artificially augment the correct order, k, by the maximal order of integration, say d_{max}. Once this is done, a $(k+d_{max})^{th}$ order of VAR is estimated and the coefficients of the last lagged d_{max} vectors are ignored (Caporale and Pittis, 1999). The causality test conducted is based on the multivariate system of equations:

$\varphi_t = \begin{bmatrix} 0 \ if \ t \leq (n\tau) \\ 1 \ if \ t > (n\tau) \end{bmatrix}$ where the unknown parameter $\tau \in (0,1)$ implies the timing of the break point, and $(n\tau)$ denotes integer part.

$$\begin{bmatrix} \ln OFDI_t \\ \ln NOFDI_t \\ \ln OIMP_t \\ \ln NOIMP_t \\ \ln OEXP_t \\ \ln NOEXP_t \\ \partial_t \end{bmatrix} = A_0 + A_i \begin{bmatrix} \ln OFDI_{t-i} \\ \ln NOFDI_{t-i} \\ \ln OIMP_{t-i} \\ \ln NOIMP_{t-i} \\ \ln OEXP_{t-i} \\ \ln NOEXP_{t-i} \\ \partial_{t-i} \end{bmatrix} + ... + A_n \begin{bmatrix} \ln OFDI_{t-n} \\ \ln NOFDI_{t-n} \\ \ln OIMP_{t-n} \\ \ln NOIMP_{t-n} \\ \ln OEXP_{t-n} \\ \ln NOEXP_{t-n} \\ \partial_{t-n} \end{bmatrix} + \begin{bmatrix} \varepsilon_{\ln OFDI_t} \\ \varepsilon_{\ln NOFDI_t} \\ \varepsilon_{\ln OIMP_t} \\ \varepsilon_{\ln NOIMP_t} \\ \varepsilon_{\ln OEXP_t} \\ \varepsilon_{\ln NOEXP_t} \\ \varepsilon_{\partial_t} \end{bmatrix} \quad (8)$$

In equation (8), $A_i...A_n$ are supposedly 7×n matrices of coefficients with A_0 being the 7×1 identity matrix, ε_s are the error terms assumed to be white noise. From equation (8), we can test the hypothesis of Granger non-causality of oil FDI and the other variables that make up the system (excluding non-oil FDI) with the following hypothesis: $Ho = \sum_{i=1}^{n} \alpha_{1i} = 0$ and non-causality running from the other variables in the system (excluding to non-oil FDI) to oil FDI with the following hypothesis: $Ho = \sum_{i=1}^{n} \alpha_{1i} = 0$

Granger causality implies that the lagged value of non-oil FDI or oil FDI influence oil and non-oil exports and imports significantly in equation 8 and the lagged value of oil and non-oil imports and exports influence oil and non-oil FDI significantly in the system represented by equation 8. In other words, we can jointly test if the estimated lagged coefficients are different from zero using the F-statistic. When the joint test rejects the two null hypotheses that the lagged coefficients are not different from zero, causal relationships between the variables is confirmed.

IV.3 Data Issues

Annual data covering the period 1960 to 2013 were utilised for this paper and the description and source of data are presented in Table 2.

Table 2: The variables: description and sources of data[6]

Variable	Description	Source of data
Oil Foreign Direct Investment (OFDI)	Total annual inflow in million naira	Central Bank of Nigeria Statistical Bulletin 2013 online
Non-Oil Foreign Direct Investment (NOFDI)	Total annual inflow in million naira	Central Bank of Nigeria Statistical Bulletin 2013 online
Oil Imports (OIMP)	Annual in million naira. Cost Insurance and Freight (cif).	Central Bank of Nigeria Statistical Bulletin 2013 online
Non-Oil Imports (NOIMP)	Annual in million naira. Cost Insurance and Freight (cif)	Central Bank of Nigeria Statistical Bulletin 2013 online
Oil Exports (OEXP)	Annual in million naira. Free on Board (fob).	Central Bank of Nigeria Statistical Bulletin 2013 online
Non-Oil Exports (NOEXP)	Annual in million naira. Free on Board (fob).	Central Bank of Nigeria Statistical Bulletin 2013 online

Source: *Compiled by the authors*

V. Discussion of Results

V.1 Unit Root Test

The null hypothesis of the Z-A (1992) is that $\alpha = 1$ i.e. the series has a unit root with structural break in constant, trend or constant and trend stationary process. Given our assumption that the break fraction is derived from the estimation of equations 2, 3 and 4 using the critical values provided by Z-A, Table 3 shows sufficient evidence of rejecting the null hypothesis of the presence of a unit root with structural breaks at the 1.0, 5.0 or 10.0 per cent level. For some variables that did not fall within the 1.0, 5.0 and 10.0 per cent critical values, they were found to be significant at levels above the 50% critical value reported in Table 3, panel B, of Zivot and Andrews (2002). Thus, we conclude that the structural breaks in the series are not sturdy enough to generate any divergence with the results of conventional unit root tests.

6. Note: All variables excluding GDP growth rate are in logarithmic form. Due to data limitation, five year moving average was used to generate OFDI and NOFDI for 1960, 1961 and 2010.

Table 3: Zivot-Andrews Unit Root Test Results

Variable	Z-A (1992)								
	Model A			Model B			Model C		
	t	Breakpoint	Lag	t	Breakpoint	Lag	t	Breakpoint	Lag
LNNOEXP	-2.65*	1995	0	-4.39***	1983	0	-5.38***	1987	0
LNNOFDI	-3.62	1995	1	na	na	na	-4.26**	2004	1
LNNOIMP	-3.90**	1991	0	-2.65	2005	0	-3.47**	1995	0
LNOEXP	-3.58***	1969	0	-3.26	2005	0	-3.59**	1995	0
LNOFDI	-3.52**	1991	4	-1.34	1980	4	-3.45**	1992	4
LNOIMP	-4.61***	1986	0	-2.99	1973	0	6.06***	1986	0

*Notes: The break locations i.e. intercept, trend and both, are denoted by Models A, B and C. *, ** and *** imply significance at 10.0, 5.0 and 1.0 per cent respectively, based on percentage points of the asymptotic distribution critical values as provided by Zivot and Andrew (1992) Table 2, page 30.*

Source: *Authors' computation using Eviews 7*

V.2 Cointegration Test

Although our cointegration analysis is predicated on the regime shift model (as in equation 7), we also estimated the level shift as well as level shift and trend models (equations 5 and 6). As noted by Gregory and Hansen (1996), the regime shift model estimates the break point more accurately with smaller standard deviations, compared with the level shift or level shift with trend models. Thus, the implication of this finding for the subsequent analysis is based on the outcome of the regime shift model. The Akaike Information Criteria (AIC) is used to determine the optimal lag-length out of a maximum of 8 lags.

Findings of the G-H cointegration test are presented in Table 4a and 4b. We found evidence of a significant long-run relationship amongst the variables considered, as the augmented ADF, Zt and Za test statistics proposed by Gregory and Hansen (1996) exceeded the critical values at the 10 per cent level (for the level shift) and 5 per cent level (for the level shift with trend and regime shift model). This implies that there is a long-run relationship between oil FDI inflows (LNOFDI) and non-oil exports and imports in the Nigerian economy with an observed break in 1992, which coincided with the 1992 parliamentary elections and build up to the 1993 presidential elections and perhaps, the aftermath of the oil price shock of 1990 consequent upon the invasion of

Kuwait by Iraq. More so, the early 1990s depicted a period of global economic slowdown that spilled over from the 1980s.

Table 4a: Gregory-Hansen Cointegration Test Results (dependent variable: LNOFDI)

Model	Level Shift	Level Shift with Trend	Regime Shift
		ADF Procedure	
t-stat	-5.07	-5.15	-6.96
Lag	1	0	0
Break	1993	1986	1988
		Phillips Procedure	
Za-stat	-49.41	-49.90	-49.19
Za-break	1992	1992	1992
Zt-stat	-8.02*	-8.17**	-8.08**
Zt-break	1990	1990	1992

*, ** and *** imply significance at 10.0, 5.0 and 1.0 per cent, respectively based on percentage points of the asymptotic distribution critical values as provided by Gregory and Hansen (1996) table 1 page 109 (m=4).
Source: Authors' computation using Eviews 7

However, we found no evidence of cointegration between non-oil FDI (LNNOFDI) and oil and non-oil exports and imports in Nigeria. This may be partly explained by the relatively low FDI inflows and trade volumes in the non-oil sector, compared with that of the oil sector. While this may seem quite puzzling at first, Gregory and Hansen (1996) opined that empirical investigations of long-run relationships would best be served using complementary statistical tests. Thus, on the Engle and Granger ADF-based cointegration test where we included the observed break date to ascertain the long-run relationship between the variables were adopted.

Table 4b: Gregory-Hansen Cointegration Test Results (dependent variable: LNNOFDI)

Model	Level Shift	Level Shift with Trend	Regime Shift
		ADF Procedure	
t-stat	-4.55	-4.86	-4.98
Lag	0	2	0
Break	1980	2000	1980
		Phillips Procedure	
Za-stat	-31.22	-25.88	-34.93
Za-break	1979	2002	1980
Zt-stat	-4.59	-4.02	-5.03
Zt-break	1980	2002	1980

*, ** and *** imply significance at 10.0, 5.0 and 1.0 per cent respectively based on percentage points of the asymptotic distribution critical values as provided by Gregory and Hansen (1996) table 1 page 109 (m=4).
Source: *Authors' computation using Eviews 7*

Table 5 revealed the significance of the ADF statistic of the residuals of the estimated model in line with the Engle and Granger procedure. Evidently, the result of the residual-based unit root test indicated that there exists a long-run relationship between non-oil FDI inflows and the other variables considered. The implication of this finding is that there exists a causal relationship amongst the variables, but the result provided no indication regarding the direction of causality.

Table 5: ADF-based Cointegration Test

		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		-4.301	0.001
Test critical values:	1.0 per cent	-3.560	
	5.0 per cent	-2.918	
	10.0 per cent	-2.607	

Source: Authors' computation using Eviews 7

V.3 Causality Test

The out come of the causality test conducted was based on the estimation of a $(k+d_{max})^{th}$-order VAR model in levels and subsequent tests of general restrictions on the parameter matrices even if the processes may be integrated or cointegrated of an arbitrary order. We ignored the coefficient matrices of the last d_{max} lagged vectors in the model because they are regarded as zeros. We proceeded to test linear or nonlinear restrictions on the first k coefficient matrices using the standard asymptotic theory (See Toda and Yamamoto, 1995; for a lucid exposition of the mechanics).

Basically, the Wald test (block exogeneity test) is applied to the relevant coefficients. This procedure entails testing for causality between integrated variables based on asymptotic theory. We test the null hypothesis of Granger non-causality running from oil and non-oil FDI to oil and non-oil imports and exports with the following hypothesis $Ho=\sum_{i=1}^{n}\alpha_{1i}=0$ and a null hypothesis of Granger non-causality from oil and non-oil exports and imports to oil and non-oil FDI $Ho=\sum_{i=1}^{n}\alpha_{1i}=0$ This is a test for the null hypothesis that no causality exists between the variables against alternatives that causality exists.

The result of the Toda-Yamamoto causality test is presented in Tables 6a and 6b. The results presented in Table 6a indicated that we can reject the null hypothesis of no causality from oil exports (LNOEXP) and non-oil imports (LNNOIMP) to oil FDI inflows. This finding reinforces our cointegration test, which suggested the existence of a long-run relationship between the variables and invariably implies that at least one causal linkage must exist. What makes our finding differ with other previous similar studies may be the fact that they failed to account for structural breaks and considered the nexus in a highly aggregated manner. This could lead to misleading inferences, particularly given the fact that the effect of structural breaks in the series was evident.

The VAR model on the basis of which the Toda-Yamamoto causality test was conducted is presented in Tables 1 and 2 in the Appendix. Table 1 in the appendix revealed that that an increase in the lagged value of oil imports would reduce FDI flows to the oil sector by approximately 2.0 per cent, while oil exports was found to be positively related to oil FDI in Nigeria. While non-oil import was found to be inversely related to oil FDIs; non-oil exports in Nigeria was a positive function of FDI flows in the oil sector. A 1.0 percent increase in the one period lagged value of oil FDI exerted a 7.0 per cent increase in oil imports and exports as well as non-oil imports, while non-oil exports on the other hand increased by almost 10.0 per cent.

Table 6a: Toda-Yamamoto Causality Test Results

Model 1: Dependent Variable LNOFDI	
Null Hypothesis	**MWALD (Prob.)**
LNNOEXP causes LNOFDI	2.356 (0.838)
LNNOIMP causes LNOFDI	5.530 (0.019)
LNOEXP causes LNOFDI	13.330 (0.000)
LNOIMP causes LNOFDI	0.042 (0.838)
LNOFDI causes LNNOEXP	1.019 (0.313)
LNOFDI causes LNNOIMP	0.927 (0.336)
LNOFDI causes LNOEXP	0.277 (0.599)
LNOFDI causes LNOIMP	0.142 (0.707)

Note: Sample (1960-2010), 51 observations were included
Source: Authors' computation using Eviews 7

Distinctly, uni-causal linkage running from non-oil FDI to non-oil import was observed in Table 6b. A plausible explanation why no other causation was found may be attributed to the weak cointegrating relationship from the Gregory-Hansen long-run test. Nevertheless, the existence of at least one causal relationship reinforces the cointegrating relationship revealed from the ADF-based long-run test. The VAR model on which the T-Y causality test result shown in Table 6b is presented in Table 2 of the appendix. The result showed that oil imports and exports as well as non-oil imports and exports were positive functions of the one non-oil FDI inflows and vice versa.

Table 6b: Toda-Yamamoto Causality Test Results

Model 1: Dependent Variable LNNOFDI	
Null Hypothesis	**MWALD (Prob.)**
LNNOEXP causes LNNOFDI	0.003 (0.279)
LNNOIMP causes LNNOFDI	1.173 (0.279)
LNOEXP causes LNNOFDI	1.782 (0.182)
LNOIMP causes LNNOFDI	0.000 (0.991)
LNNOFDI causes LNNOEXP	12.017 (0.001)
LNNOFDI causes LNNOIMP	0.115 (0.734)
LNNOFDI causes LNOEXP	2.608 (0.106)
LNNOFDI causes LNOIMP	0.942 (0.332)

Note: Sample (1960-2010), 48 observations were included
Source: Authors' computation using Eviews 7.

An examination of the residuals based on the LM test signified the absence of serial correlation in our model. The estimated models were dynamically stable as indicated by the inverse root of the AR characteristic polynomial (see Figures 4 and 5), thus, the VAR on the basis of which the Toda-Yamamoto test was conducted satisfied the stationarity condition as indicated by the charts, an indication of the estimated models' stability and robustness.

Figure 4

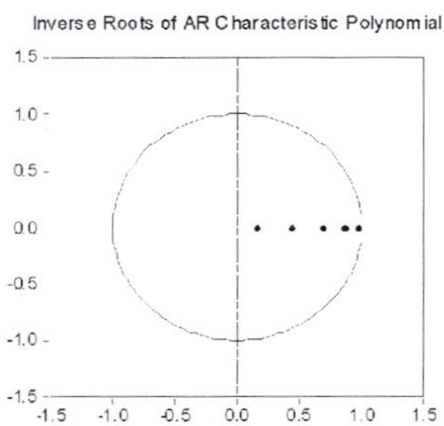
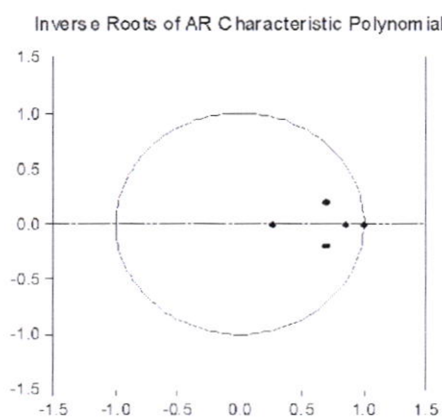


Figure 5



Source: *Graphed by Authors' using Eviews 7.*

VI. Conclusion and Policy Implications

This paper examined the relationships between FDI and trade in Nigeria for the period, 1960 to 2010. Specifically, the piece investigated the causal links between FDI and trade when considered under oil and non-oil for both imports and exports. A modified Wald Vector Autoregression model that treated all the variables and identified break points as endogenous was estimated and tested for causality.

The results showed that the variables employed were found to be stationary, suggesting that the structural breaks in the series were not sufficient to generate any divergence with the results of conventional unit root tests. On the presence of long-run relationship, oil FDI and the other variables considered (oil and non-oil exports and imports) were found to be co-integrated despite observed breaks of 1980, 1988 and 1992, which coincided accordingly with the positive oil price shock, the contemporaneous aftermath of Structural Adjustment Programme (SAP) and the period marred by political uncertainty in addition to agitations for a transition from military to civil rule. On the other hand, there was no evidence of long-run relationship between non-oil FDI and other variables when a break was considered, but a long-run relationship was established when a structural break was not considered. The findings also revealed a one-way causal linkage between non-oil imports and oil exports to oil FDI with no reverse causality observed, while a uni-causal linkage running from non-oil FDI to non-oil exports was recorded. The stability test carried out in the study reinforced the potency of the model.

The results further underscored the need to consider structural breaks in estimations. This implies that when structural breaks are compromised in studies on external sector parameters such as FDI and trade, the estimation techniques may yield biased estimates. This is particularly true given the fact that exogenous shocks were transmitted to the domestic economy through the trade and investment channels. The result of one-way causal linkage running from non-oil imports and oil exports to oil FDI with no reverse causality observed and non-oil FDI granger causing non-oil exports make a case for further diversification of trade such that intermediate input used in production are readily available. This serves as an incentive for multinational corporations who seek least cost production entities. In addition, diversification is expected to help reduce the dependence on oil as the sole revenue earner of government. The causal influence of non-oil imports on oil FDI suggests that reducing trade restrictions through tariff and non-tariff barriers would contribute towards increasing oil FDI inflows.

The findings also suggested that increased oil export earnings serves as an incentive to oil FDI investments given the vast investment opportunities in the oil and gas sector occasioned by reforms such as deregulation of the downstream sector and the proposed petroleum industry bill. The causal link from non-oil FDI to non-oil exports implies that government may consider policies skewed towards further strengthening domestic markets and the provision of favourable investment climate in the non-oil sector to encourage non-oil FDIs, which is expected to boost non-oil exports. To enhance trade diversification, more efforts need to be geared towards creating a conducive investment climate that can spur direct investment in various non-oil sectors of the economy that have dragged over the years, compared with the oil sector.

References

Abdel-Rahman, A-M. M.(2007). "Determinants of Foreign Direct Investment in the Kingdom of Saudi Arabia", Culled from http://faculty.ksu.edu.sa/ammar/Publications/Determinants%20of%20Foreign%20Diredct%20Investment%20in%20KSA.pdf Accessed 25th February.

Aizeman, J. and Noy, I. (2005)."Foreign Direct Investment and Trade – Two – way Linkage", *National Bureau of Economic ResearchWorking Paper* No. 11403.

Aminian, N., Fung, K.C and Ilzaca, H. (2007)."Foreign Direct Investment, Intra-regional Trade and Investment sharing in East Asia",*RIETI Discussion* Paper No. 7-E-064.

Awolusi, O. D. (2012). "Foreign Direct Investment and Economic Growth in Nigeria: A Vector Error Correction Modeling", *Journal of Research in Economics and International Finance*, 1(3), pp. 58-69.

Bezuidenhout, H. and Naude, W. (2008). "Foreign Direct Investment and Trade in Southern African Development Community", Working Paper Series RP 2008/88, *World Institute for Development Economic Research* (UNU-WIDER).

Binh, Duong.N and Tran ThiAnh-Dao (2010)."Sub-regional Intergration Initiatives in East Asia and their implication for Vietnam", *Journal of Social and Policy Sciences*, Vol 1, Number 1, 37-64.

Blonigen, B. A. (2001). "In search of substitution between foreign production and exports", *Journal of International Economics* 53(1): 81-104.

Bowen, H. P., Hollander, A. and Viaene, J-M.(1998). *Applied International Trade Analysis*, Ann Arbor/London: University of Michigan Press and MacMillan Press Ltd.

Caporale, G. M. and Pittis, N. (1999). "Efficient estimations of cointegrating vectors and testing for causality in vector autoregressions", *Journal of Economic Surveys* 13, 3-35.

Central Bank of Nigeria (CBN) (2011). Statistical Bulletin.

Chaisrisawatsuk, S. and W. Chaisrisawatsuk (2007). "Imports, exports and foreign direct investment interactions and their effects", pp.97-115, Chapter IV in ESCAP, *Towards coherent policy frameworks: understanding trade and investment linkages – A study by the Asia-Pacific Research and Training Network on Trade*, United Nations, New York.

Clarke, J. and Mirza, S. A. (2006)."Comparison of some common methods of detecting Granger non-causality", *Journal of Statistical Computations and Simulations* 76, 207-231.

Duong, N. B., Anh, T. T., and Phuong, C. T. M. (2012). "On the Linkage between FDI and Trade: Evidence from Vietnam", *SECO/WTI Academic Cooperation Project* Working Paper Series 5.

Eaton, J. and Tamura, A. (1994)."Bilateralism and Regionalism in Japanese and US Trade and Direct Foreign Investment Patterns", *National Bureau of Economic Research Working Paper* No. 4758.

Esso, L. J. (2010)."Threshold cointegration and causality relationship between energy use and Growth in seven African countries", *Energy Economics* 30, 2391-2400.

Fontagne, L. M. and Freudenberg (1999)."Foreign Direct Investment and International Trade: Complements or Substitutes?", *OECDScience, Technology and Industry Working Papers*, 1999/03, OECD Publishing.

Fontagne, L. M., Freudenberg and Pajot, M. (1997). "How Foreign Direct Investment Affects International Trade and Competitiveness - an Empirical Assessment", *Working Paper CEPII*, No. 17.

Forte, R. (2004)."The relationship between foreign direct investment and international trade.Substitution or complementarity? A survey", FEP Working Papers 140, *Universidade do Porto, Faculdade de Economia do Porto*.

Gregory, A. and Hansen, B. (1996)."Residual-based tests for cointegration in models with Regime Shifts" *Journal of Econometrics* 70, 99–126.

Helpman, E. (1984). "A Simple Theory of International Trade with Multinational Corporations", *Journal of Political Economy*, 92, pp. 451-471.

Helpman, E. and Krugman, P. (1985). "Market Structure and Foreign Trade", Cambridge, MA: MIT Press, 1985.

List, J. A. (2001). "US county-level determinants of inbound FDI: evidence from a two-step modified count data model", *International Journal of Industrial Organisation*, 19 (6): 953-973.

Liu, X., Wang, C.and Wei, Y. (2001). "Causal links between foreign direct investment and trade in China", *China Economic Review* 12(2-3): 190-202.

Markusen, J.R. and A. J. Venables (1995). "Multinational Firms and the New Trade Theory", *National Bureau of Economic Research Working Paper*No. 5036, February.

Mundell, R. (1957). "International Trade and Factor Mobility", *American Economic Review* 47(3): 321-335.

Ndem, S. E., Okoronkwo, O. and Nwamuo, C.U. (2014). "The Determinants of Foreign Direct Investment and Their Impacts on Nigerian Economy (1975-2010)", *Journal of Integrative Humanism-Ghana*, pp.74-84

Nkuna, O.B. (2012). "Intra-Regional FDI in SADC: A Case of South Africa and Mauritius Outward FDI", Work in Progress Submitted to *African Economic Research Consortium (AERC)*. November 19, 2013.

Okpe, I. J. and Abu, G. A. (2009). "Foreign Private Investment and Poverty Reduction in Nigeria (1975 to 2003)", *Journal for Social sciences*, Vol. 19, no. 3, pp. 205-211.

Olufemi, M.S. and Keke, N. A. (2014). "Real Output Effects of Foreign Direct Investment in Nigeria", *Journal of Behavioural Economics, Finance, Entrepreneurship, Accounting and Transport*, 2 (1), pp. 1-7.

Perron, P. (1989)."The great crash, the oil price shock and the unit root hypothesis", *Econometrica* 57, 1361-1401.

Raff, H. (2004). "Preferential Trade Agreements and Tax Competition for Foreign Direct Investment", *Journal of Public Economics*, 88, 2745-2763.

Rambaldi, A. N. and H. E. Doran (1996). "Testing for granger non-causality in cointegration systems made easy", Working Paper No.88. *Department of Econometrics, University of New England*.

Sadiq, T. A., and Bolbol, A. A. (2001). "Capital Flows, Foreign Direct Investment and

Technology Spill-over Evidence from Arab Countries", *World Development, 29*, 2111-2125.

Sultan Z. A. (2013). "A Causal Relationship between FDI Inflows and Export: The Case of India", *Journal of Economics and Sustainable Development*, Vol.4 (2): 1-9.

Tadesse, B. and Ryan, M. (2002). "*The FDI-Trade Relationship: Are Developing Countries Different*", Prepared for the 2002 Northeast Universities Development Consortium Conference at Williams College, Williamstown, MA.

Toda, H.Y. and Yamamoto, T. (1995). "Statistical inferences in vector autoregressions with possibly integrated processes", *Journal of Econometrics* 66, 225-50.

Vernon, R. (1966)."International investment and international trade in the product cycle", *Quarterly Journal of Economics*, pp. 223-247.

Waheed, A. and Jawaid, S. T. (2010). "Inward Foreign Direct Investment and Aggregate Imports: Time Series Evidence from Pakistan", *International Economics and Finance Journal, Vol. 5, Nos. 1-2, pp 33-43.*

Yamawaki, H. (1991). "Exports and foreign distributional activities--evidence from Japanese firms in the US", *Review of Economics and Statistics* 73(2): 294-300. 27.

Zivot, E. and Andrews, D. (1992)."Further evidence of great crash, the oil price shock and unit root hypothesis", *Journal of Business and Economic Statistics*10, 251-270.

APPENDIX

Table 1: VAR Estimates (LNOFDI is the dependent variable)

	LNOFDI	LNOIMP	LNOEXP	LNNOIMP	LNNOEXP
LNOFDI(-1)	0.218994	-0.063579	-0.061288	-0.077851	0.096991
	-0.0908	-0.16885	-0.11647	-0.08084	-0.09608
	[2.41173]	[-0.37655]	[-0.52624]	[-0.96306]	[1.00948]
LNOIMP(-1)	-0.017061	0.69406	0.291358	0.219714	0.242094
	-0.0834	-0.15507	-0.10697	-0.07424	-0.08824
	[-0.20457]	[4.47566]	[2.72384]	[2.95936]	[2.74346]
LNOEXP(-1)	0.362022	0.167505	1.001459	0.260532	-0.045997
	-0.09916	-0.18438	-0.12718	-0.08827	-0.10492
	[3.65098]	[0.90848]	[7.87435]	[2.95142]	[-0.43840]
LNNOIMP(-1)	-0.359256	-0.018012	-0.279922	0.45875	-0.065606
	-0.15277	-0.28407	-0.19594	-0.136	-0.16165
	[-2.35163]	[-0.06341]	[-1.42859]	[3.37316]	[-0.40586]
LNNOEXP(-1)	0.128275	0.167821	-0.064686	-0.021881	0.756813
	-0.08356	-0.15538	-0.10718	-0.07439	-0.08842
	[1.53507]	[1.08005]	[-0.60354]	[-0.29413]	[8.55935]
C	7.24278	0.778211	1.762139	2.220811	0.354189
	-0.95042	-1.76727	-1.21902	-0.8461	-1.00565
	[7.62059]	[0.44035]	[1.44554]	[2.62476]	[0.35220]
DUM_92	-2.751205	-0.874109	0.115818	-0.188938	0.315659
	-0.36321	-0.67537	-0.46585	-0.32334	-0.38431
	[-7.57473]	[-1.29426]	[0.24861]	[-0.58433]	[0.82136]
R-squared	0.983729	0.981901	0.990785	0.99344	0.985364
Adj. R-squared	0.98151	0.979433	0.989528	0.992545	0.983368
Sum sq. resids	4.830829	16.70302	7.947102	3.828532	5.408594
S.E. equation	0.331348	0.616128	0.424989	0.294978	0.350603
F-statistic	443.3726	397.8526	788.4769	1110.544	493.6994
Log likelihood	-12.26727	-43.90185	-24.9609	-6.337589	-15.14803
Akaike AIC	0.755579	1.996151	1.253369	0.523043	0.86855
Schwarz SC	1.020732	2.261304	1.518521	0.788195	1.133703
Mean dependent	8.36092	8.198781	10.56974	10.45351	8.276697
S.D. dependent	2.43681	4.296245	4.15311	3.416469	2.718564
Determinant resid covariance (dof adj.)				2.56E-05	
Determinant resid covariance				1.23E-05	
Log likelihood				-73.44503	
Akaike information criterion				4.252746	
Schwarz criterion				5.578509	

Source: Authors' computation using Eviews 7.

Table 2: VAR Estimates (LNNOFDI is the dependent variable)

	LNNOFDI	LNNOIMP	LNOEXP	LNOIMP	LNNOEXP
LNNOFDI(-1)	0.805594	0.051065	0.33765	0.295177	0.540158
	-0.0788	-0.15027	-0.20909	-0.30406	-0.15582
	[10.2235]	[0.33981]	[1.61484]	[0.97079]	[3.46656]
LNOIMP(-1)	0.066438	0.522166	-0.276752	-0.060517	-0.243358
	-0.06133	-0.11697	-0.16275	-0.23667	-0.12128
	[1.08321]	[4.46421]	[-1.70048]	[-0.25570]	[-2.00651]
LNOEXP(-1)	0.044943	0.197563	0.898111	0.014254	-0.05898
	-0.03367	-0.06421	-0.08935	-0.12992	-0.06658
	[1.33478]	[3.07675]	[10.0522]	[0.10971]	[-0.88583]
LNNOIMP(-1)	0.000405	0.226276	0.262597	0.696158	0.309903
	-0.03653	-0.06967	-0.09695	-0.14098	-0.07225
	[0.01108]	[3.24765]	[2.70872]	[4.93814]	[4.28958]
LNNOEXP(-1)	0.128275	0.167821	-0.064686	-0.021881	0.756813
	-0.08356	-0.15538	-0.10718	-0.07439	-0.08842
	[1.53507]	[1.08005]	[-0.60354]	[-0.29413]	[8.55935]
C	0.619209	1.546313	0.823819	-1.702885	0.088038
	-0.26966	-0.51425	-0.71553	-1.04052	-0.53323
	[2.29629]	[3.00693]	[1.15133]	[-1.63658]	[0.16510]
DUM_92	0.102138	-0.119496	-0.358956	0.376381	-0.719476
	-0.11801	-0.22504	-0.31313	-0.45535	-0.23335
	[0.86552]	[-0.53099]	[-1.14635]	[0.82658]	[-3.08323]
R-squared	0.996034	0.993116	0.990985	0.982171	0.988265
Adj. R-squared	0.995516	0.992218	0.989809	0.979846	0.986735
Sum sq. resids	1.10904	4.033423	7.808823	16.51285	4.336669
S.E. equation	0.155273	0.296113	0.412016	0.599145	0.307043
F-statistic	1925.295	1105.963	842.7471	422.3453	645.6741
Log likelihood	27.26638	-6.948313	-24.45524	-44.30069	-8.869327
Akaike AIC	-0.764769	0.526351	1.18699	1.935875	0.598843
Schwarz SC	-0.504542	0.786579	1.447218	2.196102	0.85907
Mean dependent	9.002984	10.49368	10.62148	8.244858	8.281348
S.D. dependent	2.318891	3.35662	4.081342	4.220329	2.665895
Determinant resid covariance (dof adj.)				5.04E-06	
Determinant resid covariance				2.48E-06	
Log likelihood				-33.97554	
Akaike information criterion				2.602851	
Schwarz criterion				3.903987	

Source: Authors' computation using Eviews 7.