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A Test for Complementarity or Substitutability between Foreign Direct Investment (FDI) and International Trade: Evidence from Nigeria's Non-Oil Sector

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Abstract
This study investigated the dynamic relationship between foreign direct investment and trade in Nigeria's non-oil sector between 1981 and 2015. Though the theoretical literature argues that there could be complementarity or substitutability between them, the empirical literature has remained inconclusive. Invoking the product life-cycle theory proposed by Vernon (1966) and employing the Autoregressive Distributed Lag (ARDL) framework, we examined the nature of the relationship between non-oil trade (both imports and exports) and inward non-oil FDI stock while controlling for real gross domestic product, real effective exchange rate, and average manufacturing capacity utilization. Our empirical results showed a significant complementary relationship between Nigeria's inward non-oil FDI stock and non-oil exports. Meanwhile, no relationship was observed between inward non-oil FDI stock, non-oil import, and non-oil total trade. To this end, inward FDI stock in Nigeria's non-oil sector complements the sector's exports, automatically boosting non-oil exports. We also established that economic growth reinforced the complementary relationship between inward FDI stocks in the non-oil sector and aggregated and disaggregated trade measures, particularly over the short-term horizon. Therefore, appropriate inward FDI stock is required to boost the export performance of Nigeria's non-oil sector, which would help diversify the fiscal revenue and foreign exchange sources away from the traditional oil and gas sector.
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1. Introduction

The nexus between foreign direct investment (FDI) and international trade has been debated for many decades. It has been subjected to empirical and theoretical scrutiny since then because both FDI and trade are vital components of development, economic integration, and economic growth as the world economies become globalized (Evidence from Williamson, 2004). Ayanwale (2007) opined that many developing countries see FDI as a strategy for economic development; this could result from domestic savings augmentation (capital accumulation that bridges the savings-investment gap), technological advancement, and the business management role played by FDI. Theoretically, international trade has also been seen as an agent of economic development that stimulates innovation, productivity, competitiveness, and diversification because of exchange and specialization gains from countries that engage in it (Markusen et al., 1995). As a result, different parts of the world have begun to witness high growth rates in FDI (both inflows and stocks) and international trade (both exports and imports), especially developing countries across Africa, Asia, Oceania, Latin America, and the Caribbean.

Evidence from UNCTAD World Investment Report (2016) showed that developing countries made up half of the top ten host economies for FDI inflows in the year 2015, with a growth rate of 5% and 9% in the year

2014 and 2015, respectively {from US$662 billion in 2013 to US$ 698 billion in 2014 and US$765 billion in 2015). In addition, for the inward FDI stock, a growth rate of 3.8% was recorded in 2015 (from US$712.49 billion in 2014 to US$740.44 billion in 2015). Many developing countries witnessed this vast level and growth of FDI stock, with Asia witnessing a colossal growth in FDI flows. By contrast, Africa, Latin America, and the Caribbean witnessed a decline in FDI flows by 7%, 2%, and 33%, respectively, in 2015. This could largely be attributed to the plunge in global commodity prices that started in the second half of 2014, weighing heavily on FDI flows to oil-exporting Sub-Saharan African countries, including Nigeria. WTO (2017) showed that developing economies have increased their participation in international trade over the last twenty years, and this paved the way for their ranking as the top exporting economies in the world in the year 2014, from the contribution of US$1.28 trillion to the world's exports in the year 1995 to US$8,072billion in the year 2014. The share of their exports in the world's total export increased from 26% in 1995 to 44% in 2014, while the share of the developed economies' exports declined from 70% in 1995 to 52% in 2014.

The theories of comparative advantage dominated the early literature; specifically, the Heckscher-Ohlin-Samuelson (H-O-S) model, which regards FDI as a direct substitute for cross-border trade in goods and services, whereas another strand of the literature, comprising the new trade theory and the theory of multinationals, suggests that a complementary relationship exists between FDI and trade. While only a few empirical studies supported the former assertion, a large body of empirics confirmed the latter hypothesis (See Forte, 2004; Martens, 2008 and Fukasaku, 2002 for theoretical and empirical literature surveys).

More so, on the empirical part, most previous studies have shown that international trade and foreign direct investment are complements rather than substitutes if the trade between two economies is based on comparative advantages (Chaisrisawatsuk & Chaisrisawatsuk, 2007). However, where trade between the two countries is based on their absolute advantages, there may be substitutability between trade and foreign direct investment as businesses decide to supply products and services through exports or FDI. In a nutshell, if FDI and trade complement each other, it creates trade (trade-enhancing effect of FDI), while if they substitute for each other, FDI diverts trade (Trade diverting effect). Several studies have been conducted on the FDI-trade nexus (see, for instance, Blonigen (2001), Waheed and Jawaid (2010), Sultan (2013), Mohammed et al. (2014), Onyekwena et al. (2015), Chaisrisawatsuk et al. (2007). Nevertheless, the researchers could not reach a consensus, which could be traced to the theoretical underpinnings, the model specification, the degree of disaggregation of trade and FDI flow data, the choice and measurement of the selected variables, and the estimation techniques employed (Martens, 2008). The urge for this study is to validate and re-validate the actual relationship between FDI and trade for the Nigerian case by considering the non-oil sector of the economy. This is because Nigeria's non-oil sector is the major contributor to the nation's real GDP and overall economic growth.

Nigeria is an economy with a great demand for foreign goods and services, the second-largest recipient of FDI stock in Africa (12%), and the largest recipient of FDI stock in West Africa (60%) in 2015 (see UNCTAD, 2016). 90% of the FDI inflows into Nigeria go to the oil and gas sector, while the remaining 10% of total flows are left for the non-oil sector. However, the oil sector only contributed a paltry 9.61% to the total GDP, while the non-oil sector, whose share stood at 90.39% of GDP in 2015, received a smaller share in FDI inflows (NBS, GDP report, Q4 2016). In this case, FDI inflows to Nigeria have been channeled to the wrong sectors with little or no effect on economic growth. Also, according to some analysts, the capacity of Africa to attract FDI is principally determined by its natural resources and market size; these motives behind FDI inflow into most African countries are defined as market- and resource-seeking FDI, which enhances trade diversion. Thus, if FDI displaces trade, then exports will be replaced by domestic sales in foreign markets, which is detrimental to the domestic industry of the host country and may also open up the country to exigencies of externally-induced shocks, with direct and indirect implications for internal and external balances.

Meanwhile, if trade and FDI are rounded, investing abroad might lead to lesser competitiveness in the foreign request, expanding the import base of the host country. Mundell(1957) supposed that commodity movements would eventually replace factor movements to a larger extent. Countries' trouble covering their domestic diligence contributes to rising walls to either trade or factor mobility, ultimately leading to trade restrictions that will induce factor movement by creating both prices and pay envelope differentials. thus, the broad ideal of this study is to examine the relationship between inward FDI stock and trade in Nigeria's non-oil sector. The empirical literature observed that FDI overflows were substantially examined while paying little attention to FDI stock. More so, many studies, like Mohammed *et al.,* (2014), use disaggregated inward FDI data on oil painting and non-oil for the Nigerian case, while no attention is paid to studying the FDI in the non-oil sectoral corruption. To this end, the current study examines the nexus between inward FDI stock and trade in Nigeria's non-oil sector, using added-up and disaggregated trade data.

Following the preface, the rest of the paper is structured as follows Section 2 presents the background of the study. Section 3 reviews the theoretical and empirical literature on the relationship between FDI and Trade. Section 4 entails the methodology employed in the study. Section 5 discusses the results, while Section 6 concludes the paper with some policy recommendations and counteraccusations.

2. Stylized Data

According to NBS GDP Quarter 4, 2016 report, the Nigerian economy could be better understood based on its oil and non-oil sectorial classification. Its oil sectors include crude petroleum and natural gas, while the non-oil sectors consist of all the Nigerian sectors, excluding the oil sectors. The growth rate in the oil sectors has been negative from 2012 (-4.95%) till 2015 (-5.43%), while the growth rate in non-oil sectors is fluctuating but still positive, which suggests that the latter is the primary driver of growth in Nigeria. The growth in the non-oil sectors in 2015 (3.75%) was driven mainly by the Trade sector, which grew by 5.1%, followed by the Service sector at 4.5%, Construction at 4.4%, and the Agriculture sector at 3.7% (CBN, 2015 report). The oil sector, which was the lower contributor (9.61%) to the Real GDP in 2015, remains the largest exported good of Nigeria, accounting for 92.5% value of exported goods (₦9,016.3billion) and also the primary receipt of the government accounting for ₦3,830.1billion (indicating 55.4%) out of N6,912.5 billion revenue generated in 2015.

While the Non-oil sectors remain the driver of economic growth in Nigeria by contributing 90.39% to the Real GDP in 2015, it constitutes the major imports of the country by taking the largest share (in value) of 77.59% in the total merchandized imports (₦9,686.8billion) in 2015 (CBN, 2015). The rebasing exercise (2010 constant base year) has led to a change in the sectorial structure of the Nigerian economy (WTO, 2017), whereby the industrial sector is no longer the largest contributor to the Real GDP, as it has been in the years back (before 2006). From 2006 till date, the Industry sector has been superseded by the Service sector (most especially, Information and Communication and Financial and Insurance sectors), making Nigeria a service-driven economy. From 2008 to 2015, the contribution of the service sector to Real GDP increased from 32.15% to 36.76% (a rose of 4.61%), followed by the Agriculture sector which fall from 25.31% to 23.11% (2.2% downfall), Industry sector from 24.05% to 19.30% (4.75% shortfall), Trade from 15.76% to16.95% (1.19% increase), and lastly Construction sector rose from 2.73% to 3.8% (1.15% increase). See Tables 1 and 2 for details.

Table 1. Growth Rate of Oil and Non-oil Sectors (% GDP)

Year	2011	2012	2013	2014	2015
RGDP (growth)	5.31	4.2	5.49	6.22	2.97
Oil GDP (growth)	2.30	-4.95	-13.07	-1.32	-5.43
Non-oil GDP (growth)	5.90	5.81	8.42	7.18	3.78

Source: NBS GDP Quarter 4, 2016, and CBN (2015) Reports.

Table 2. Non-oil Sectorial Share in Real GDP (%)

Activity Sector	1981	1990	2000	2005	2010	2008	2015
Agric	15.50	17.95	20.44	25.40	23.89	25.31	23.33
Industry	43.28	44.19	37.19	31.15	22.03	24.05	20.59
Construction	5.58	2.29	2.76	2.32	2.88	2.73	3.59
Trade	11.60	11.51	11.29	12.78	16.47	15.76	16.62
Service	24.04	24.06	28.32	28.35	34.73	32.15	35.87

Source: NBS GDP Quarter 4, 2016, and CBN (2015) Reports.

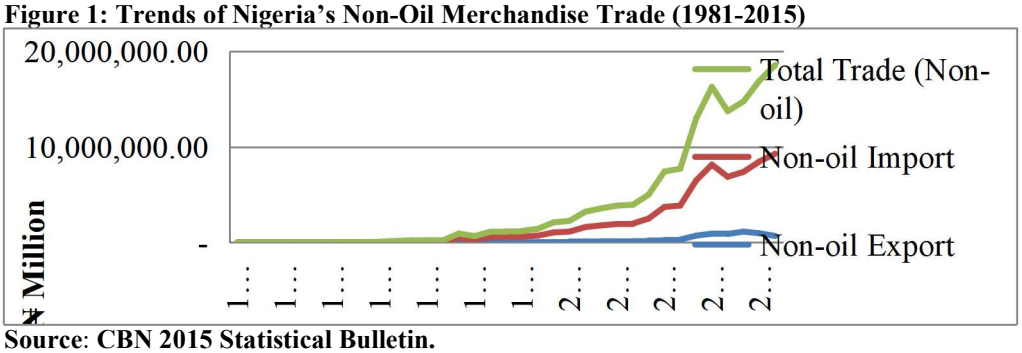
The stylized facts on the evolution of inward non-oil FDI stock, non-oil import and export (Non-oil Total trade) in Nigeria between 1981 and 2015 are depicted in table 3.

Table 3: Inward FDI Stock and Trade of Non-oil Sector in Nigeria 1981-2015 (₦ Million)

Year	Inward FDI Stock (Nonoil)	Total trade (Non-oil)	Non-oil import	Non-oil export
1981	3,231.9	11,888.60	11,545.80	342.80
1985	6,060.0	6,853.50	6,356.30	497.20
1991	13,054.2	73,715.80	69,038.60	4,677.20
1995	62,644.3	463,223.80	443,121.00	20,102.80
2001	99,829.7	1,046,802.12	1,018,793.55	28,008.57
2005	243,339.9	1,927,372.07	1,821,416.19	105,955.88
2011	7,281,950.0	15,128,849.32	5,995,140.89	9,133,708.43
2015	8,059,863.5	9,290,704.44	8,613,936.83	676,767.61

Source: CBN Statistical Bulletin and Economic Report (2009-2015)

Figure 1: Trends of Nigeria's Non-Oil Merchandise Trade (1981-2015)

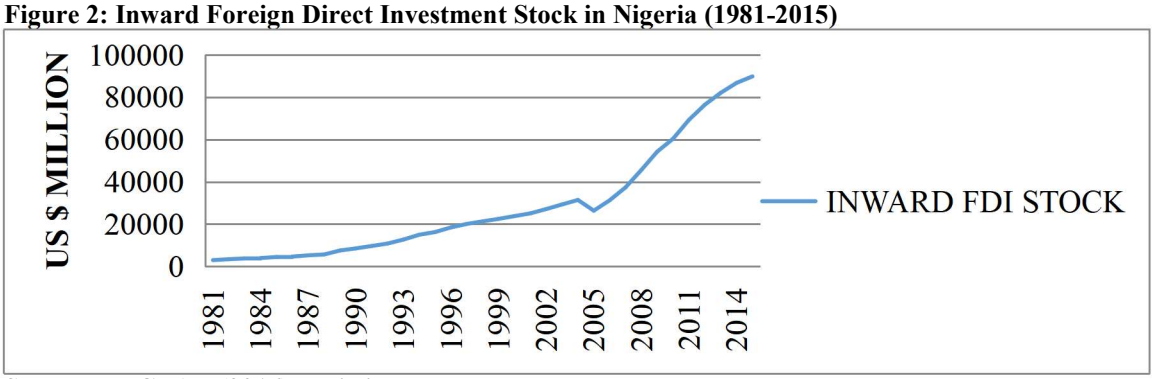


Source: **CBN 2015 Statistical Bulletin.**

Over the years of study, the total trade of non-oil goods increased until 2012, when it decreased from a peak of ₦8,150,400 million in 2011 to ₦6,874,800 million in 2012. This could be attributed to a decline in exports and imports in the non-oil sectors due to trade policy reform implemented during this period, such as an increase in banned goods imported into Nigeria for health and safety reasons. In 2013, it rose again till it reached the highest peak value of ₦9,270,700 million in 2015; this is rooted in an increase in non-oil imports. The trend shows that between 1981 and 2015, Nigeria has continued to record a deficit in its non-oil external trade account, as the country's non-oil imports are more than its non-oil exports. This is not unprecedented because the oil and gas sector constitutes 92.5% of Nigeria's total merchandise export. The remaining 7.5% share could be traced to export earnings from the non-oil sector. The reason is that Nigeria has a comparative cost advantage in the extraction of crude oil since these resources are abundant in Nigeria, while the non-oil sector goods dominate the import of Nigeria from other countries because Nigeria has a comparative disadvantage in their production, implying that the country runs a trade deficit in its non-oil sector.

On the other hand, foreign direct investment (FDI) as a long-term foreign investment in Nigeria has also played a cognitive role in the Nigerian economy since its inception. According to the World Investment Report (2007), foreign direct investment flows have three components; namely, equity capital (purchase of shares abroad), reinvested earnings (part of earnings not distributed as dividends), and intra-company loans (short- and long-term borrowing and lending between the parent enterprise and the affiliates). In contrast, foreign direct investment stock is the value of the share of the direct investment enterprises' capital and reserves (including retained profits) attributable to the parent enterprise plus the net indebtedness of affiliates to the parent enterprise. According to UNCTAD (2016), Nigeria is among the top recipients of FDI in Africa but, when compared to developed and industrialized countries, is among the lowest recipients because of its incapability to attract more FDI, also called ***absorptive capacity constraints*** – including but not limited to the infrastructural deficit, underdeveloped local financial market and negative and/or very weak positive spill-over effect on domestic investment (See Adekunle, 2018). Though its inward FDI stock has been on the high side throughout the years of study, where it stood at US$89,735.4 million in 2015, only in 2005, there was a shortfall from US$31,402.5 million to US$26,345 million in Nigeria from 1981 and 2015. (See **Figure 2**).

Figure 2: Inward Foreign Direct Investment Stock in Nigeria (1981-2015)

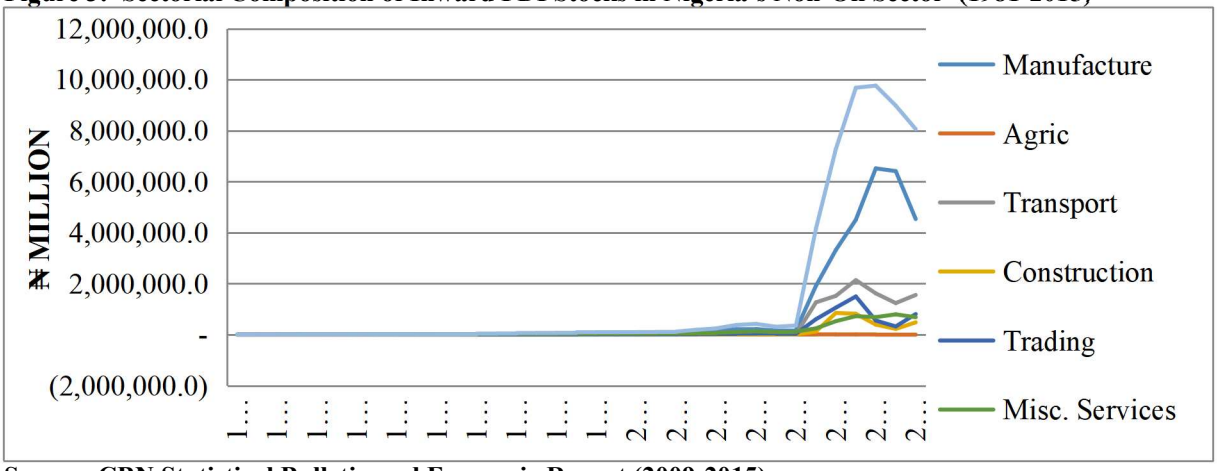


Source: UNCTAD (2016) statistics database

The FDI stock across the Nigerian non-oil sectors shown in Figure 3 excludes the Mining and Quarry sector because oil and gas constitute the more significant percentage of FDI in the sector (as reported by CBN and NBS). Still, the percentage distribution of FDI in this sector was unknown to the research due to the unavailability of data on the actual percentage of FDI that goes to the sub-sectors under the sector. Moreover, the distribution of FDI across the non-oil sectors since 1981 has been negligible, except the manufacturing sector that received the attention, which dominated the non-oil FDI by receiving the largest value of N9.7 billion from the total value of ₦14 billion in 1992 (approximately 69% of the total non-oil FDI). Until 1993-2003 when the share of Miscellaneous services in the total non-oil FDI surpassed the others because the sub-sectors under this

sector were given attention by the foreign investors, most especially in the Financial sector, may be due to capitalization policy and exchange rate policy embarked on by Central Bank of Nigeria during this period, while Agriculture, Forestry and Fishing sector received a constant value of ₦1.2billion between 1993 and 2006. From 2004-2015 manufacturing sector regained its title as the largest receiver of FDI in Nigeria's non-oil sectors.

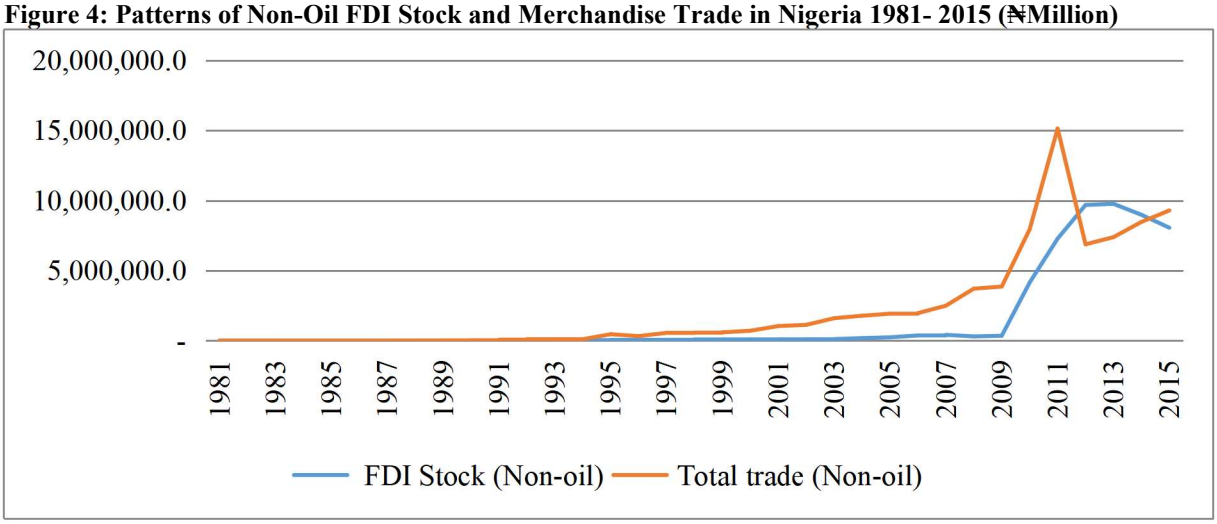
Figure 3: Sectorial Composition of Inward FDI Stocks in Nigeria's Non-Oil Sector (1981-2015)



Source: CBN Statistical Bulletin and Economic Report (2009-2015)

It can be derived from Figure 4 that the growth rate of non-oil total trade is above non-oil FDI from 1981 to 2011(in value terms) and therefore indicate that trade drove FDI within this period, while from 2012 to 2014, FDI caught trade which, implies that FDI drive trade during this period, wherein 2015 trade took over its pace. Hence, over the time study, there was a feedback effect between FDI and trade (meaning they both drive each other). From 1991 to 1989 trade growth rate was constant; from 1990 – 1993, it witnessed a slight growth rate until 1994, when it started to rise to the peak value of ₦ million in 2011. While FDI witnessed slight growth between 1993 and 2003, from 2004, it started to rise till it reached the peak value of ₦ million in 2013, surpassing the trade growth rate. These changes could be; a result of the oil painting smash witnessed by the country during this period that increased the import and import of Nigeria and also due to an increase in the participation of foreign investors in Nigeria as a result of the Nigerian investment creation policy initiated by the Nigeria government in 1995. In 2012 trade witnessed a space to the value of ₦ million; in 2013, it rose again but was lower than that of the FDI; in 2015, it rose above FDI again. For FDI, it witnessed a slight space in 2008, perhaps due to the global financial meltdown heads during this period; in 2014, it began to witness a downfall again, falling short of trade 2015. This could be embedded in numerous factors, similar to exchange rate heads, low world commodity prices, instability problems, and general election fear.

Figure 4: Patterns of Non-Oil FDI Stock and Merchandise Trade in Nigeria 1981- 2015 (₦Million)



Source: CBN Statistical Bulletin (various years).

3. Literature Review

3.1 Theoretical Literature

Factor Endowment Theory: Robert Mundell has tried to explain FDI through a model of transnational trade in his seminal work named" International trade and factor mobility (1957) grounded on H- O- S (Heckscher- Ohlin-

Samuelson) frame, involving two countries, two goods, two product factors and identical product functions in both countries, where the product of a good requires an advanced proportion of a factor than the other. Mundell studies the relationship between factor overflows and trade in the environment of relaxing one of the hypotheticals of the H- O- S proposition that capital is immobile across the countries by allowing commodity movements and some degree of factor mobility. He presuppositions that commodity movements and factor movements are backups; considering a situation where a prohibitively high tariff on significances shuts off trade and raises the return to capital in the country where the factor is fairly scarce, this leads to capital flux to that country. An increase in the volume of factors causes a drop in the trade volume of such a country; hence, factor flows cover trade overflows. Mundell posits two extreme cases between which these conditions could be set up in the real world. First, they are the case of perfect factor mobility but no trade or factor immobility with free trade. Second, Mundell concludes that capital mobility driven by FDI constitutes a perfect cover for exports.

OLI- Paradigm/Eclectic Theory: This is one of the FDI propositions that reflects the idea of its substitutability with trade. Dunning(1977) epitomized the motives for serving a foreign request in the OLI paradigm/ miscellaneous proposition, which states that Power, Locational, and Internalization advantages are necessary conditions for FDI to do. The power advantages correspond to impalpable means similar to specialized capability and directorial chops that will work for an establishment to contend in a foreign country. Locational advantages correspond to factors bents and tariffs that attract a transnational to a specific position. In particular, differences in trade walls inform an establishment's choice to serve a foreign request either through trade or FDI. Internalization advantages indicate that the choice between FDI and trade are indispensable strategy, as enterprises will choose to direct investment abroad rather than exportation or licensing when these indispensable arrangements' sale and association costs overweigh the costs of internalizing the request.

International Product Life-cycle Theory 2**(1966)** concentrated on the dynamics of relative advantage and drew alleviation from the product life cycle to explain how trade patterns change over time. His proposition described an internationalization process, where an original manufacturer in an advanced country begins dealing a new technologically advanced product to high- come consumers in its home request. Product capabilities make locals stay in close contact with their guests and minimize threats and queries. As consumer demand rises in other requests, product shifts abroad, enabling the establishment to maximize husbandry of scale and bypass trade walls. He argued that technological products pass through three stages of the product. These stages are new products known as invention, maturity, and standardized product stage. Thus, Vernon (1966), in his Product Life Cycle (PLC) proposition, explained the positive part of FDI in promoting exports from host countries; hence, his advanced trade proposition complements FDI.

3.2. Empirical Literature

However, whether FDI and trade are reciprocal or not can be determined theoretically alone; the nature of their relationship is an empirical question. In the International economics and business literature, the nexus between FDI and International trade is centered on whether FDI is a cover for or a complement to transnational trade and whether they beget each other or not.

Mohammed and Ekundayo (2014) examined the connections between FDI and trade in Nigeria between 1960 and 2010, using disaggregated data set that captures the oil painting and non-oil contradiction of the Nigerian economy. They investigated the causal links between oil and non-oil components of FDI and exports and imports in Nigeria with a Modified Wald Vector Auto-regression model and Toda-Yamamoto non-causality test that treated all the variables identified breakpoints as endogenous. Findings revealed a one-way causal linkage between non-oil imports and oil exports to oil FDI with no reverse causality. A unidirectional causal linkage from non-oil FDI to non-oil exports was also found. In addition, the result revealed a complementary relationship between trade and FDI in Nigeria in the face of its oil and non-oil sector. Awolusi (2012) investigated the long-run and short-run relationship among economic growth, FDI, trade, and domestic investment in Nigeria from 1970 to 2010. Multivariate co-integration techniques and a vector error-correction model were employed in the study. The findings affirmed the existence of co-integrated vectors, suggesting the long-run relationship among economic growth, FDI, trade, and domestic investment. Further, unidirectional and bidirectional causality was reported among the employed variables.

Olusegun *et al.* (2009) examine the empirical econometric substantiation of both unproductive and long-run interaction among foreign direct investment, trade openness, and profitable growth in Nigeria between 1970-2006. The study employed the Toda- Yamamotonon-causality test and bus-accumulative distributed pause (ARDL) fashion; the result shows a unidirectional reason running from foreign direct investment to affair and trade openness to affair. In addition, the ARDL co-integration procedure shows that foreign direct investment and trade openness are appreciatively related and significant in explaining affair growth in Nigeria. This indicates that the variables round each other. Onyekwena *et al.,* (2015) examine the effect of inward FDI in West Africa on exports to EU countries and the BRICS (banning Russia) covering 2000 to 2010. It delved into a host country's perspective impact of FDI on different import orders primary, intermediate, and final goods, using the"

commodity- propinquity" model and stoked graveness model, and the result shows that the effect of FDI on the host country's import differs across import orders. Global presence in the ECOWAS region is associated with increased exports of primary goods, a drop in exports of intermediate goods, and no effect on final goods. Also, an analogous result was set up when the FDI- trade relation between ECOWAS and the BICS was considered; one presumptive explanation for this patient observation is that FDI into the region remains resource-seeking. Rather than cast dubieties on the utility of FDI inrushes, the result suggests that the sectorial target of similar capital flux is vital to the trade performance of the philanthropist country. In this finding, the relationship between FDI and trade regarding the regions under study is nebulous; the relationship depends on the order of goods under study.

Chaisrisawatsuk and Chaisrisawatsuk (2007) delved into bi-directional goods between transnational trade and investment using data from 26 Organization for the Economic Cooperation and Development (OECD) and 6 Association of the Southeast Asian Nations (ASEAN) countries between 1980 and 2005 and modeled by graveness model. They set up that exports or significances were reciprocal with FDI inrushes. The study linked trade facilitation as a critical factor in converting FDI inrushes to the host country from the home country. Bilateral FDI inrushes were observed to have a feedback effect on exports of the home and host countries and those of other trading mates. Analogous liaisons between bilateral FDI inrushes and significances were also observed.

Anwar and Nguyen (2011) employed the multi-dimensional approach of the graveness model to examine the impact of FDI on exports, significances, and net exports in Vietnam for 1990 and 2007. Their empirical analyses show that FDI from 19 OECD countries in Vietnam appreciatively correlates to its exports, significances, and net exports. Thus, a complementarity relationship exists between FDI and import and between FDI and significance in Vietnam. Shuhei (2013)employs recently- constructed product-position data covering 32 products and 49 host countries over the period 1993- 2008 to examine the impact of the overseas operation of upstream enterprises(corridor and factors suppliers) on corridor and factors import of the Japanese machine assiduity, by using the Poissonpseudo-maximum-likelihood(PPML) fashion. It's set up that the overseas operation of an upstream establishment leads to fresh exports of intermediate goods from the home country. The finding of a reciprocal relationship between FDI and intermediate exports from Japan contradicts the popular view that the growing overseas exertion of transnational enterprises could replace intermediate exports from a home country, thereby depriving the home country of job openings.

Waheed and Jawaid (2010) delved into the impact of inward foreign direct investment (FDI) on aggregate significance in Pakistan using the periodic time series data from 1981 to 2007. Their results suggested a significant long-run relationship between inward FDI and aggregate significance in Pakistan. At the same time, the penurious short-term dynamic error-correction model verified a significant positive short-run relationship with a high speed of adaptation. The reason result showed unidirectional reasons running from inward FDI to aggregate significances in the country. Hence, the complementarity relationship prevails. Head and Ries (2001)habituated panel data on 932 Japanese recent manufacturing enterprises(machines) to estimate the Japanese automaker's exports to the world, with the ordinary least square estimator(OLS) for 1966- 1991. A substitutability relationship was set up. Their results give further substantiation of the significance of perpendicular FDI. It confirms that enterprises having an advanced degree of perpendicular integration show lesser complementarity between manufacturing FDI and exports. Brainard (1997) set up strong evidence for the propinquity- attention trade- off on the assiduity position for 27 US requests using the 2SLS estimator; he identifies that when the income per capita of the mate country catches up to the US position, FDI tends to substitute import. Markusen (1995) points out that the transfer of knowledge-grounded means causes substitutability between products abroad and exporting when applying the capital-knowledge model to time series data for ten products from 1978 to 1991 between Japan and the US.

Blonigen (2001) examined the relationship between exports and FDI in the United States and Japan in the automotive spare corridor and electronic sectors, using Sur retrogression to probe time series product- position data between 1978 and 1994. A negotiation effect was detected between the product of the Japanese machine corridor in the US and Japanese exports of the machine corridor to the USA. In addition, the relationship between the product of Japanese motorcars (final goods) in the USA and Japanese exports of machine corridor turns out to be reciprocal. Greenaway and Katherine (2000) extended the disquisition with the country characteristics to determine the specific of FDI, i.e. perpendicular or vertical. Next, they examine the relationship on bilateral data for the USA with 26 mate countries over 12 times. The results indicate that vertical FDI is more likely to dominate when countries are analogous in relative skill bents and size and trade costs are moderate to high – hence FDI and trade are backups. Whereas perpendicular FDI is likely to dominate when countries differ in relative skill bents and size and trade costs are low; hence FDI and trade are complements. In addition, Turkan (2006) used USA product-level panel data for 1989-2003 with a gravity model. Fixed and random effects show a complementary effect for intermediate goods and slight substitution effects for finished goods. Falk and Hake (2007) investigate the link between exports and outward FDI stock, using panel data on industries and a sample

of seven European Union (EU) member countries for 1973-2004. Panel causality tests developed by Holtz-Eakin, Newey, and Rosen (1988) were employed; the GMM estimator shows that exports cause FDI but not vice-versa.

From those mentioned earlier, it can be deduced that most existing works point to a complementarity relationship, particularly between FDI and exports (only a few consider the imports side). According to Head and Ries (2001), the difficulty in finding a substitutability relationship empirically can be due to the existence of potential sources of spurious positive relationships between the two variables, such as endogeneity (use of endogenous variables, such as the foreign subsidiaries' sales/production, as FDI indicator) and aggregation bias that results from the use of aggregate data. Also, for the Nigerian case, only Mohammed Ekundayo (2014) examined the relationship among FDI, export, and import within the Nigerian economy's oil and non-oil sectors dichotomy. Still, they examined the linkages across the Nigerian sector, using the FDI inflows as a proxy for FDI. More so, other researchers such as Awolusi (2012) and Olusegun et al. (2009) find the impact of FDI and trade on the economic growth of Nigeria by considering their impact on the export of Nigeria while neglecting the side of investigating the main link that exists between FDI and trade (both on import and export) of Nigeria.

Studies on cross-country and specific countries asides from Nigeria, such as Chaisrisawatsuk et al. (2007), and Onyekwena et al. (2015), among others, also centered their findings on the linkage between non-sectorial FDI and export, only Waheed and Jawaid (2010) studied on aggregate FDI and import. In addition, the majority studied the bilateral side of international transactions while neglecting the multilateral side, which makes most of them employ the gravity model. In other words, only a few, such as Falk and Hake (2008), study the stock aspect of FDI, while the majority study the flow aspect of FDI and only use the ARDL approach to test the relationship. To fill these gaps, this study centered its findings on the nexus that exist between sectorial compositions of non-oil inward FDI stock, non-oil imports and exports (non-oil trade) between Nigeria and the rest of the world, with the use of the Autoregressive Distributed lag model (Bound test to test for long-run relationship), developed by Pesaran, Shin and Smith (2001) which shows that co-integrating systems can be estimated as ARDL models.

4. Data and Methodology

4.1 Data Description and Sources

Table 4: Data of the Variables Employed in the Study (1981-2015)

Years	Non-oil FDI Stock (₦ million)	Non-oil Total trade (₦ million)	Non-oil export (fob) (₦million)	Non-oil import (cif) ₦ million	RGDP (₦ billion)	REER ₦	MCU (%)
1981-1985	24,854.5	43903.20	1591.90	42311.30	72,825.98	2089.87	267.9
1986-1990	42080.4	101642.70	11675.50	89967.20	83,317.60	585.29	205.7
1991-1995	172927.8	864568.70	39376.60	825189.10	99079.57	425.13	177
1996-2000	419492.2	2781869.83	121227.40	2660642.43	111,437.58	855.91	165.96
2001-2005	753,561.4	7,494990.84	436782.09	7058208.75	158,430.20	389.57	264.6
2006-2010	5614295.7	19989121.85	1590712.81	18398409.04	233398.79	472.40	271.88
2011-2015	43767613.5	47154133.04	12776643.96	34377489.08	316836.37	583.67	292.20

Source: CBN, 2009 - 2016

This analysis is based on time series annual data of Nigeria between 1981 and 2015. The data source includes the Central Bank of Nigeria Statistical Bulletin (2009-2015), the CBN Journal of Applied Statistics (2016), the CBN Survey of Foreign Assets and Liabilities in Nigeria report (2011), and the CBN Annual Economic Report (2015). The variables employed are Inward foreign direct investment stock (non-oil), Total trade (non-oil), Real effective exchange rate (2010 base year) proxy as REER, Average manufacturing capacity utilization (2010=100) proxy as MCU, and Real gross domestic product (2010 constant year) proxy as RGDP, Non-oil import {Cost Insurance and Freight(cif)} and Non-oil export {Free on Board(fob)}.

4.2 Theoretical Framework

The theory that underpins this study is a Product Life Cycle Theory set forth by Vernon (1966, 1971). The theory intended to address the apparent inadequacy of the comparative advantage framework in explaining trade and foreign investment and concentrate on the timing of innovation, effects of economies of scale, and, to some extent, the role of uncertainty. The product life cycle theory explains how a company will begin by exporting its products and eventually undertake foreign direct investment (FDI) as the product moves through its life cycle. Besides that, the theory also shows how a country's export eventually becomes its import under some conditions. The theory suggested three stages in a product's life: the new product stage, maturing product stage and standardized product stage, and explained how FDI occurs in the maturing product stage and standardized product stage. In the new product stage, a firm introduces an innovative product to a felt need in the domestic market. As the product's fortunes are unknown, it is produced in a limited quantity and sold mainly in the domestic market. The product picks up as it gains consumer acceptance and popularity in the maturing product stage, and then its demands rise both in domestic and foreign markets. Therefore, the innovating firm sets up

manufacturing facilities abroad to expand production capacity and meet the growing demand from domestic and foreign consumers. In the last stage, the product becomes a commodity. The market becomes price sensitive, and the manufacturers are motivated to search for low-cost producing countries to reduce production costs. As a result, the product begins to be imported into the innovating firm's home country.

Mathematically, at Stage 1: $AY_1^n = f(K_1, L_1 \ldots V_1)$ (1)

Stage 2 : $y_2^n = f(I_2, l_2, \ldots v_2)$, $where \frac{\partial Y_t}{\partial t} = y_t \geq 0$; $\frac{\partial K_t}{\partial t} = k_t = I_t > 0$; $\frac{\partial L_t}{\partial t} = l_t > 0$; $\frac{\partial V_t}{\partial t} = v_t \geq 0$; and $I_t = I_d + I_f$ (2)

$y_3^n = f(I_f)$, by holding other variables constant, $I_f = g(AI_3^x, BC_d^n, BX_3^n)$ (3)

$y_3^n = f\{g(AI_3^x, BC_d^n, BX_3^n\}$ (4)

AY_1^n is the quantity of n-product produced by the innovating firm in country A at stage 1, $K_1, L_1, and\ V_1$ are capital, labour, and innovation employed, respectively, for the production of n-product in stage 1. $y_2^n, I_2, l_2, and\ v_2$ are the changes in the output of n-product, changes in the capital (which is the investment), labour and innovation used to produce n-product in stage 2 respectively $;it$ is the investment on n-product in stage 2; that comprises domestic and foreign investments (Id +If) y_3^n is the output of n-product in stage 3, which is determined by the value of foreign direct investment of country A invested in country B at stage 3 (I_f). In contrast, I_f is determined by the capital good (x) of country A imported to country B (AI_3^x), domestic consumption of n-product in country B (BC_d^n), and n-good of country B exported to country A (BX_3^n) in the third period. $f\ and\ g$ are the functional relationships between the variables.

4.3 Model Specification

Since the theoretical framework for this study shows that an increase in demand for a product-led to productivity expansion and an increase in export of the home country to the host country, which later drives FDI into the host country, then the broad model for the study is specified as follows:

$TR_t = f(FDI_t, Y_t)^{\alpha}$; Where $Y_t = (REER_t, RGDP_t, MCU_t)$ (5)

Taking the natural logarithm to linearize equation 5 gives:

$Model\ 1 \rightarrow lnTR_t = \alpha_0 + \alpha_1 lnFDI_t + \alpha_2 lnREER_t + \alpha_3 lnRGDP_t + \alpha_4 MCU_t + \mu_t$ (6)

The breakdown of model 1 gives birth to models 2 and 3, which utilize the two trade components.

$Model\ 2 \rightarrow ln\ EXP_t = \gamma_0 + \gamma_1 lnFDI_t + \gamma_2 ln\ REER_t + \gamma_3 ln\ RGDP_t + \gamma_4 MCU_t + \theta_t$ (7)

$Model\ 3 \rightarrow ln\ IMP_t = \delta_0 + \delta_1 lnFDI_t + \delta_2 ln\ REER_t + \delta_3 ln\ RGDP_t + \delta_4 MCU_t + \sigma_t$ (8)

Where FDI = Non-oil inward foreign direct investment stock; TR = Non-oil trade (import and export); XP = Non-oil export; IMP =Non-oil import; REER = Real effective exchange rate; RGDP = Real gross domestic product; MCU = Average manufacturing capacity utilization; Y is the vector of control variables for trade. $\alpha_0, \gamma_0\ and\ \delta_0$ = Intercepts; $\alpha_1 \ldots \alpha_4, \delta_1 \ldots \delta_3, \gamma_1 \ldots \gamma_3$ = estimation coefficient; $\theta_t, \mu_t, and\ \sigma_t$ = error terms for the models specified; and ln= Natural logarithm for the variables employed in the models. Note that MCU is not logged because it is in percentage.

A priori expectation

$\alpha_1 \gtrless 0;\ \alpha_2 \gtrless 0;\ \alpha_3 > 0\ and\ \alpha_4 > 0$

$\gamma_1 > 0;\ \gamma_2 < 0;\ \gamma_3 > 0\ and\ \gamma_4 > 0$

$\delta_1 \gtrless 0;\ \delta_2 > 0;\ \delta_3 > 0\ and\ \delta_4 \gtrless 0$

A priori expectation

$\alpha_1 \gtrless 0;\ \alpha_2 \gtrless 0;\ \alpha_3 > 0\ and\ \alpha_4 > 0$

$\gamma_1 > 0;\ \gamma_2 < 0;\ \gamma_3 > 0\ and\ \gamma_4 > 0$

$\delta_1 \gtrless 0;\ \delta_2 > 0;\ \delta_3 > 0\ and\ \delta_4 \gtrless 0$

The parameters of interest in the study are $\alpha_1,\ \gamma_1\ and\ \delta_1 > 0$. If the coefficients are positive, hence complementarity relationship prevails between FDI and Trade of the non-oil sector, but if $\alpha_1,\ \gamma_1\ and\ \delta_1 < 0$. If the coefficients are negative, FDI substitutes trade in the non-oil sector.

4.4 Estimation Procedure

Unit Root Tests

Unit root testing is well known for determining the stationary of variables in econometrics. There are many economic and econometric implications of a unit root in time series data, including the incidence of spurious

regression (Libanio, 2005). Due to its importance, many tests and procedures were developed for testing unit roots, such as ADF, P-P, KPSS, ERS, and NG-Perron unit root tests, among others. Nevertheless, out of those unit-root tests, only Ng-Perron's (2001) unit-root tests will be employed to test for the stationary of the variables under study. The test incorporates the properties of DF-GLS (Dickey-Fuller- General Least Square). The Phillips Perron test claims that the test performs exceptionally well, especially in an opposing moving average. However, the performance of the test depends heavily on the choice of spectral density estimators used in the Construction of the test. Ng & Perron (2001) proposed four test statistics based on GLS-detrended data for investigating the existence of unit roots, namely MZ_{α}^{GLS}, MZ_{t}^{GLS}, MSB, and MP_{T}^{GLS}. GLS detrending series regression equation goes thus;

$$\Delta y_t^d = \rho y_{t-i}^d + \beta_1 \sum_{i=1}^{T} \Delta y_{t-i}^d + \varepsilon_t \quad (9)$$

H_0: $\rho = 1$ (y_t is non-stationary or contains a unit root) (10)

H_1: $\rho < 1$ ($_{it}$ is stationary or does not contain a unit root) (11)

The decision rule is that *"reject (or accept) the null hypothesis of a unit root if the Ng-Perron test statistics are less (or greater) than the asymptotic critical values in any of the conventional levels of significance, which are 1%, 5%, and 10%".*

Bounds test for Co-integration

The bounds test is flexible as it accommodates both stationary and integrated series, unlike other co-integration tests, such as Engle-Granger and Johansen tests that consider only stationary series. Traditional methods of estimating co-integrating relationships, such as Engle-Granger and Johansen co-integration, required that the variables be integrated in the same order. All variables are I(1) or I(0). To alleviate this problem, Pesaran et al. (2001) showed that co-integrating systems could be estimated as ARDL (Autoregressive distribution lag) models, with the advantage that variables in the co-integrating relationship can be of the combination of I(0) and I(1) without having to pre-specify which variables are I(0) or I(1). Also, unlike other methods of estimating co-integrating relationships, the ARDL representation does not require symmetry of leg lengths, as each variable can have a different number of lag terms. Following Pesaran et al. (2001), the usefulness of the ARDL framework is demonstrated by applying it to the FDI-trade nexus models specified in eq. (6) – eq. (8) for the Nigerian case over the period 1981-2015, motivated by the work of Jerome et al., 2007 and Khalil et al., 2013. Therefore, models 1, 2, and 3 can be rewritten in terms of an autoregressive distributed lag model of order (p, q) as follows:

ARDL Model for models 1, 2 and 3

$$\Delta lnTR_t = \propto + \gamma_1 lnTR_{t-1} + \gamma_2 lnFDI_{t-1} + \gamma_3 lnREE_{t-1} + \gamma_4 MCU_{t-1} + \gamma_5 lnRGDP_{t-1} + \delta_j \sum_{j=1}^{p-1} \Delta lnTR_{t-j} + \alpha_j \sum_{j=0}^{q_1-1} \Delta lnFDI_{t-j} + \beta_j \sum_{j=0}^{q_2-1} \Delta lnREER_{t-j} + \theta_j \sum_{j=0}^{q_3-1} \Delta MCU_{t-j} + \rho_j \sum_{j=0}^{q_4-1} \Delta lnRGDP_{t-j} + \epsilon_t \quad (12)$$

$$\Delta lnXP_t = \delta_1 lnXP_{t-1} + \delta_2 lnFDI_{t-1} + \delta_3 lnREER_{t-1} + \delta_4 lnRGDP_{t-1} + \delta_5 MCU_{t-1} + \gamma_k \sum_{j=1}^{p-1} \Delta lnXP_{t-k} + \alpha_k \sum_{k=0}^{q_1-1} \Delta lnFDI_{t-k} + \beta_k \sum_{k=0}^{q_2-1} \Delta lnREER_{t-k} + \theta_j \sum_{k=0}^{q_3-1} \Delta MCU + \rho_k \sum_{k=0}^{q_4-1} \Delta lnRGDP_{t-k} + \mu_{t-1} \quad (13)$$

$$\Delta lnXP_t = \delta_1 lnXP_{t-1} + \delta_2 lnFDI_{t-1} + \delta_3 lnREER_{t-1} + \delta_4 lnRGDP_{t-1} + \delta_5 MCU_{t-1} + \gamma_k \sum_{j=1}^{p-1} \Delta lnXP_{t-k} + \alpha_k \sum_{k=0}^{q_1-1} \Delta lnFDI_{t-k} + \beta_k \sum_{k=0}^{q_2-1} \Delta lnREER_{t-k} + \theta_j \sum_{k=0}^{q_3-1} \Delta MCU + \rho_k \sum_{k=0}^{q_4-1} \Delta lnRGDP_{t-k} + \mu_{t-1} \quad (14)$$

H_0: $\gamma_1 = \delta_1 = \pi_1 = 0$: There is no co-integration between FDI and trade having controlled for other variables;

H_1: $\gamma_1 \neq \delta_1 \neq \pi_1 \neq 0$: There is co-integration between FDI and trade having controlled for other variables.

The decision rule following Pesaran *et al.* (2001) is that *"reject (accept) the null hypothesis (H_0) if the F-statistics is above (below) the upper (lower) critical bounds value. While the test becomes inconclusive if the F-statistics fall within the bounds."*

Post-estimation Tests

Here, the estimated models would be subject to post-mortem tests to check if they are adequate for valid and reliable statistical inferences. In light of this, the present study would investigate whether some assumptions underlie the CLRM hold or not, specifically, linearity using Ramsey RESET, normality using the Jarque-Bera test, serial correlation using the Breusch-Godfrey LM test, and heteroscedasticity tests using Breusch-Godfrey (BPG) test will be conducted as well.

5. Results and Discussion

5.1 Preliminary Results

5.1.1 Descriptive Statistics

Table 5: Descriptive Statistics of the Variables under study

Variables	Mean	Median	Maximum	Minimum	Std.Dev	Skewness	Kurtosis	Jarque-Bera (Prob. Value)
FDI	1451281	92440.4	9762490	3231.9	3124606	1.95	5.02	28.08 (0.000001)
Trade	2240864	577470.8	15128849	5114.8	3551128	1.99	6.51	40.93 (0)
Import	1812920	546248.1	8613937	4562.7	2570428	1.42	3.63	12.43 (0.002005)
Export	427943.2	24822.93	9133708	203.2	1545360	5.33	30.50	1268.36 (0)
REER	154.3387	99.12597	546.04	49.74	126.71	1.71	5	22.94 (0.00001)
RGDP	30723.60	22332.87	69023.93	13779.26	17308.63	0.95	2.52	5.59 (0.061198)
MCU	47.00657	43.8	73.3	29.29	11.20	0.15	2.11	1.30 (0.52213)
Observations	35	35	35	35	35	35	35	35

Source: Authors' computation, (2022).

The statistical features of all the employed variables shown in table 5 reveal that RGDP has the highest positive average value of #30.7trillion, followed by Trade #22408.1billion, Import #1812.9billion, FDI #1451.3billion, Export #427.9billion. In contrast, Average Manufacturing Capacity Utilization (MCU) has a lower percentage of 47 percent. The behavioural trend of the variables indicates that the Nigerian non-oil sector is import dependent; obviously, import has the largest share in the total trade of the sector, while export has the lowest; the effect can also be felt on the MCU that is averagely below the normal. Moreso, as a result of the sizeable economic size of Nigeria, proxy as RGDP, and high demand for imported goods, this drives the influx of multinational investments into the sector. Hence, FDI inflows into the non-oil sector of Nigeria are "Market seeking and Import enhancing".

Moreover, MCU and RGDP are normally distributed in which they are symmetrically distributed around their mean values, though their skewness is greater than 0 but not up to 1, and the probability value of their Jarque-bera is greater than 5 percent; hence, the series is normal in distribution. While all other variables are positively skewed, leptokurtic with peak curves with higher values than their mean and the probability values of their Jaque-bera are less than 5% percent, which implies that they are not normally distributed. Though all the series are volatile, the most widely dispersed variable is the export, which is 361.1% deviated relative to its true mean value; this can also be seen from its Kurtosis value of 30.50, which is highly greater than the normal Kurtosis value of 3. The other series have deviated as follows: FDI 215.3% deviated, import 141.78% deviated, REER 82.1% deviated, RGDP 56.4% deviated, MCU 23.8% and Trade 15.9% deviated relative to their true mean value.

The implication of the behaviour of these variables implies that the more dispersed the distribution of these variables, the higher the risk of shocks in the Nigerian non-oil sector, therefore the sector is prone to the high risk of external shocks of global crises such as global financial crises that reduced the inflow of foreign investment into the country and have a multiplier effect on the total trade of the sector by reducing the export of the sector drastically, in terms of reduction in the world commodity prices, which increases the import of the sector tremendously and lead to balance of payment deficit in the sector and the country at large.

Table 6 Correlation Matrix

	FDI	TRADE	IMPORT	EXPORT	REER	RGDP	MCU
FDI	1	0.86097	0.890224	0.49772	-0.148647	0.840658	0.45924
TRADE	0.86097	1	0.921868	0.764568	-0.235964	0.890065	0.509306
IMPORT	0.890224	0.921868	1	0.455068	-0.25908	0.966986	0.555104
EXPORT	0.49772	0.764568	0.455068	1	-0.111296	0.436899	0.247034
REER	-0.148647	-0.235964	-0.25908	-0.111296	1	-0.364818	-0.020216
RGDP	0.840658	0.890065	0.966986	0.436899	-0.364818	1	0.567512
MCU	0.45924	0.509306	0.555104	0.247034	-0.020216	0.567512	1

Source: Authors' computation, (2022).

From table 6, FDI has a strong positive correlation with trade, import, and RGDP, while it has a weak positive correlation with export and a weak negative correlation with REER. Also, all the variables understudy have a positive correlation with one another except REER, which has a negative correlation. This implies that the higher the FDI, Export, and MCU of the sector, the higher the value of Naira {Naira appreciate}, the lower will

be the effect of the dollar on Naira, and this reduces REER, which will automatically increase RGDP and import because import will be cheaper.

5.1.2 Unit Root Test Results

The result of the test shows that @ 10% critical value LTR and LIMP are stationary at levels I (0); also, at the same critical value, LRGDP and MCU are stationary at the first difference I (1), while @ 1% critical value LFDI, LREER, and LXP, are all stationary at the first difference I (1). Also, at a chosen optimal lags, LFDI and LIMP are stationary @ 8, LTR and LRGDP @ 10, LXP and MCU @ 0, and LREER @ 4 lag length. Hence the result is presented in Table 7.

Table 7: Ng- Perron (2001) Test of Unit Root

Null hypothesis: Presence of unit root for all variables
Deterministic component: Constant with no trend

Variables	Maximum lags	MZ_α	MZ_t	MSB	MP_t	Remarks
LFDI	8	-16.2959***	-2.82994***	0.17366***	1.59395***	I (1)
LTR	10	-7.08495*	-1.72186*	0.24303*	4.00302*	I (0)
LREER	4	-15.4737***	-2.78152***	0.17976***	1.58333***	I (1)
LRGDP	10	-7.45234*	-1.92965*	0.25893*	3.29004*	I (1)
LIMP	8	-7.14033*	-1.72939*	0.24220*	3.97789*	I (0)
LXP	0	-15.3752***	-2.75963***	0.17949***	1.64221***	I (1)
MCU	0	-7.13514*	-1.86120*	0.26085*	3.53122*	I (1)
Asymptotic Critical values	1%	-13.8000	-2.58000	0.25893	1.78000	***
	5%	-8.10000	-1.98000	0.23300	3.17000	**
	10%	-5.70000	-1.62000	0.27500	4.45000	*

Source: Authors' computation, (2022).

5.1.3 Bounds Test Results

Since the series are integrated of I (1) or I (0), each model's co-integration regression using the ARDL bounds test is conducted. The optimal numbers of lags on each first-difference variable selected by Akaike Information Criteria (AIC), using a maximum of 4 lags at a constant or none deterministic level, the finding of the ARDL bounds co-integration test is presented subsequently in the tables below. From Table 8, the reported F-statistics for models 1 and 3 (7.534254 and 6.211768, respectively) are greater than the upper bound critical value of 5.06 at the 1% significant level. Also, model 2 F-statistics 3.653624 is greater than the upper-bound critical value of 3.48 at the 5% significant level. Therefore, the null hypothesis is rejected, indicating a stable long-run co-integration relationship among inward FDI stock, trade, export, and import of the Nigerian non-oil sector.

Table 8: Bounds Test for Co-integration Result

Null Hypothesis: No long-run relationship exist

	Model 1 {@constant}	Model 2{@none}	Model 3 {@constant}
F- Statistic	7.534254	3.653624	6.211768
K	4	4	4
	@ none	@ constant	
Critical Bounds Value	Lower-bound Upper-bound	Lower-bound Upper bound	
Significance level	I (0) I (1)	I (0)	I(1)
10%	1.9 3.01	2.45	3.52
5% significance level	2.26 3.48	2.86	4.01
1% significance level	3.07 4.44	3.74	5.06

Source: Authors' computation, (2022).

5.2 Main Results

5.2.1 Short-run Results

Table 9: The Estimated Short-run Elasticity

Variables	Model 1 {@ constant} (trade – FDI nexus)	Model 2 {@none} (Export-FDI nexus)	Model 3 {@ constant} (Import-FDI nexus)
Dependent variable	TR= non-oil trade	XP= non-oil export	IMP= non-oil import
ΔLFDI	-0.026007(0.8631)	0.399451***(0.0025)	-0.030176(0.8561)
ΔLRGDP	10.639970**(0.0358)	7.814282** (0.0263)	10.666181**(0.0487)
ΔLREER	0.156211 (0.6144)	0.110683 (0.6831)	0.064766(0.8439)
ΔMCU	0.014433 (0.7483)	0.078952** (0.0111)	0.013277(0.7850)
Coint Eq(-1)/ ECT	-0.821757*** (0.0025)	-0.618082*** (0.0001)	-0.777854***(0.0040)
Adjusted R^{-2}	0.989947	0.981509	0.987880
F-stat [prob.]	124.0888 [0.00003]		102.8812 [0.00005]

Note: *, **, and *** represent the significance of the parameters at 10%, 5% and 1% respectively. Values in parentheses are standard errors of the estimated coefficients.

Source: Authors' computation, (2022).

Table 9 presents the estimates of the short-run models for the relationship between inwards FDI stocks and trade in the Nigeria non-oil sector, the explanation of the result is as follows:

Model 1: Trade-FDI nexus

There is a negative short-run relationship between non-oil inward FDI stock and non-oil trade in Nigeria, and the associated impact coefficient (-0.026007) is statistically insignificant. This implies that a one percent increase in inward FDI stocks, holding other factors constant, will, on average, pull down the level of Nigeria's non-oil trade by 0.026 percent; the insignificance of the impact coefficient implies that inward FDI stocks have no role to play in determining the non-oil trade in Nigeria (majorly the import). While RGDP, REER, and MCU positively affect the non-oil trade in Nigeria in the short run with the associated coefficients (10.64, 0.156, and 0.014, respectively). This implies that a one percent increase in RGDP, REER, and MCU will increase the Nigerian non-oil trade by 10.64, 0.156, and 1.4 percent, respectively. Though all the explanatory variables are in line with the a priori expectation, out of all the variables, only RGDP is statistically significant, meaning that only the real gross domestic product of Nigeria (that proxies the market size of the country) determines the level of trade in Nigeria's non-oil sector. Though there is a substitutability relationship between non-oil FDI and non-oil trade in Nigeria, FDI inflows into the Nigerian non-oil sector do not statistically influence the trade level in the sector. The coefficient of error correction term (-0.821757) is negative, less than one in absolute value, and statistically significant as expected. Therefore, the ECT coefficient that measures the speed of adjustment implies that any divergence equilibrium arising from shocks to the explanatory variables would be corrected at 82% per annum. The adjusted R^2 of 0.989947 implies that approximately 99% of the total variation in the Nigerian non-oil sector's total trade is explained by non-oil inward FDI stocks, real GDP, real effective exchange rate, and average manufacturing capacity utilization of the country. The F-statistics of 124.0888 with the probability value (0.000003) means that all the partial elasticity coefficients are jointly statistically significant at the 1% level. Hence the overall model is significant.

Model 2: Export-FDI nexus

The result shows that there exists a positive short-run relationship among inward non-oil FDI stock, non-oil export, RGDP, REER and MCU in Nigeria, with the associated impact coefficients (0.399451, 7.814282, 0.110683, and 0.078952 respectively) that are statistically significant at 1% for FDI, and 5% for RGDP and MCU, while only REER that does not statistically determine the variation in non-oil export of Nigeria. This implies that a one percent increase in non-oil inward FDI stock; real gross domestic product, real effective exchange rate, and average manufacturing capacity utilization of the country will boost up the non-oil export of Nigeria by approximately 0.399%, 7.814%, 0.111%, and 7.9% respectively. This is in conformity with a-prior expectation, but only the real effective exchange rate was in the exemption; this could result from the statistical insignificance of the variable in accounting for the variation in non-oil export of Nigeria. Hence, there exists a complementary relationship between inward FDI stocks and the export of the Nigerian non-oil sector. More so, the coefficient on the error correction term (-0.618082) of the model is negative, less than one in absolute value, and 1% statistically significant as expected; this explains the speed of adjustment of the model that any slight deviation from the equilibrium value of trade following some shocks to the explanatory variables would be corrected at the rate of 62% per annum. In addition, the adjusted R^2 of 0.981509 shows that approximately 99% of Nigeria's total variation in non-oil export is explained by inward FDI stock into the sector, real gross domestic product, real effective exchange rate, and average manufacturing capacity utilization of the country.

Model 3: Import-FDI nexus

The result interpretation for model 3 is analogous to the model 1 result. Only real gross domestic product statistically significantly explained the variation in non-oil import of Nigeria at a 5% level, whereby a one percent increase in RGDP will increase the non-oil import of Nigeria by approximately 10.67%. This implies that non-oil import dominates the non-oil trade in Nigeria over the years of study. Also, the coefficient of error correction term (-0.777854) of the model is negative, less than one in absolute value, and 1% statistically significant as expected; The coefficient implies that divergence from equilibrium following shocks to the explanatory variables would be corrected at the rate of 78% per annum. Also, the adjusted R^2 of 0.987880 shows that approximately the 99% total variation in non-oil import of Nigeria is being explained by inward FDI stock into the sector, real gross domestic product, real effective exchange rate, and average manufacturing capacity utilization of the country. The F-statistics of 102.8812 with the probability value (0.000005) means that all the partial elasticity coefficients are jointly statistically significant at a 1% level. Hence the overall model is significant.

5.2.2 The Long-run Regression Results

The long-run elasticity estimates are presented in Table 10, and the interpretation of the three versions of the long-run model proceeds as follows.

Model 1 (Trade-FDI nexus)

A negative long-run relationship exists between non-oil inward FDI stocks and non-oil trade, non-oil trade and REER, and non-oil trade and MCU in Nigeria, with the associated impact coefficients (-0.054621, -0.536520, and -0.126202 respectively) in which only MCU is statistically significant at 1%. At the same time, REER and FDI are not statistically significant. Also, there is a positive long-run relationship between non-oil trade and Nigeria's real gross domestic product, with the associated impact coefficient of 5.095320, which is statistically significant at 5%. The result implies that a one percent increase in non-oil FDI, real effective exchange rate, and average manufacturing capacity utilization will pull down the Nigerian non-oil trade by approximately 0.055 percent, 0.537 percent, and 12.6 percent, respectively. In contrast, a one percent increase in the real gross domestic product will gear up the non-oil trade by approximately 5.1 percent. Hence, inward FDI stock into this sector is import-substituting. Though this result affirms the a priori expectation as further justified by the theoretical framework of this study (Vernon, 1966), the implication is that statistically, in the long run, only real gross domestic and average manufacturing capacity utilization of Nigeria explained the variation in non-oil trade of the country.

Model 2 (Export-FDI nexus)

As shown from the result, there exists a long-run positive relationship between inward FDI stocks and the export of the Nigerian non-oil sector, and non-oil export and real gross domestic product of Nigeria, with the associated impact coefficients (0.646274 and 0.307483, respectively), that are statistically significant at 1%. In contrast, there is a long-run negative relationship between non-oil export and real effective exchange rate and non-oil export and average manufacturing capacity utilization of Nigeria. The impact coefficients of -0.518611 and -0.001677, respectively, are not statistically significant. This means that a one percent increase in the non-oil inward FDI stocks and real gross domestic product will boost the export of the non-oil sector approximately by 0.65 and 0.31 percent, respectively. Also, a one percent increase in the real effective exchange rate and average manufacturing capacity utilization will decrease the non-oil export by approximately 0.52 and 0.17 percent. Meaning that inward FDI stock into the non-oil sector complements export of the sector, and also a country with larger markets such as Nigeria, the stock of FDI is expected to be significant in such country, as the market size is a measure of market demand in a country, and this will eventually increase the productivity and export of Nigeria most especially in the non-oil sector. Campos and Kinoshita (2003) also buttress that those market-seeking investors are attracted to a country with a larger and fast-growing market. This conforms with the a priori expectation except for the average manufacturing capacity utilization due to its insignificance in explaining the variation in the non-oil export of Nigeria in the long run.

Model 3 (Import-FDI nexus)

The result shows that there exists a positive long-run relationship between the import of the Nigerian non-oil sector and inward FDI stock into the sector, and between non-oil import and real gross domestic product, with the relationship coefficients of 0.016666 (that is statistically significant at 5%) and 4.771487 (that is not statistically significant) respectively. Also, there exists a negative long-run relationship between non-oil import and real effective exchange rate, and between non-oil import and average manufacturing capacity utilization of Nigeria, with the relationship coefficients of -0.724828 (that is not statistically significant) and -0.126914 (that is statistically significant at 5%) respectively. This implies that in the long run, a one percent increase in the non-oil inward FDI stocks and real gross domestic product will pull up the non-oil import of Nigeria by approximately 0.02 and 4.77 percent, respectively. In contrast, a one percent increase in the real effective exchange rate and average manufacturing capacity utilization of Nigeria will slow down the non-oil import of Nigeria approximately by 0.72 and 12.69 percent, respectively. Although the result conforms with the a priori

expectation except for the real effective exchange rate, in which in the long-run non-oil inward FDI stocks are supposed to complement non-oil import, statistical insignificance of non-oil inward FDI stocks and real effective exchange rate nullify them from truly explaining the variation of non-oil import in the future.

Table 10: The Estimated Long-run Elasticity

Variables	Model1 {@constant} (trade – FDI nexus)		Model 2 {@none} (Export-FDI nexus)		Model 3 {@ constant} (Import-FDI nexus)	
Dependent variable	TR= non-oil trade		XP= non-oil export		IMP= non-oil import	
LFDI	-0.054621	(0.8800)	0.646274***	(0.0000)	0.016666	(0.9681)
LRGDP	5.095320**	(0.0233)	0.307483***	(0.0034)	4.771487**	(0.0481)
LREER	-0.536520	(0.2075)	-0.518611	(0.1538)	-0.724828	(0.1330)
MCU	-0.126202***	(0.0108)	-0.001677	(0.9450)	-0.126914**	(0.0181)
C	-121.4322**	(0.0326)			-112.3830*	(0.0662)

Note: *, **, and *** represent the significance of the parameters at 10%, 5% and 1%, respectively, and the values in the bracket are the probability values.

Source: Authors' computation, (2022).

5.3 Post-Estimation Test Result

The diagnostic results from Table 11 show that the probability of F-statistics for all the tests is greater than 10%, in which the null hypothesis is accepted. This indicates that all the models are correctly specified; the error terms of the estimated models are serially uncorrelated and normally distributed with constant variances in a correct functional form.

Table 11: Diagnostic Tests Results

Test	Model 1		Model 2		Model 3	
	F-Statistics	Prob.	F-Statistics	Prob.	F-Statistics	Prob.
Ramsey Reset	0.266181	0.6279	0.048597	0.8281	0.420154	0.5454
Breusch-Godfrey LM	2.797791	0.1738	0.123972	0.8842	2.526890	0.1952
Jarque-Bera	1.045854	0.5928	0.198211	0.9056	0.794473	0.6721
Breusch Pagan Godfrey	0.888018	0.6228	1.306605	0.2979	1.064914	0.5143

Source: Authors' computation, (2022).

6. Conclusion and Policy Recommendations

This paper investigated the relationship between inward FDI stocks and trade in Nigeria's non-oil sector from 1981 to 2015. We employed the ARDL framework developed by Pesaran et al. (2001). Our results showed a significant complementarity relationship between inward FDI stock and exports of the Nigerian non-oil sector both in the short-run and long run. However, there is no significant relationship between inward FDI stocks and each trade and import in Nigeria's non-oil sector both in the short and long run. This may be due to the predominance of imports in the total trade of the country's non-oil sector. Therefore, FDI tends to complement exports in Nigeria's non-oil sector, considering that the country has a comparative advantage in natural and human resources that can make multinationals enjoy lower production costs and eventually expand the trade activity of the nation in terms of boosting the productivity level of Nigeria most especially in the non-oil sector that urgently needs to be revitalized. By implication, the complementarity relationship between inward FDI stock in the non-oil sector and the non-oil export sector will contribute positively to economic growth due to the export expansion impact of the inward FDI stock. This is also buttressed by Otepola (2002) that FDI in Nigeria significantly contributes to Nigeria's economic growth, primarily through exports. To this end, we established that economic growth reinforced the positive relation between inward FDI stock in the non-oil sector and aggregated and disaggregated trade measures, particularly over the short-term horizon. Therefore, the appropriate level of FDI stock is needed in the Nigerian non-oil sector for its export expansion; hence, our findings lent some empirical support to the assertions of Vernon's (1966) international product life cycle about the nexus between trade and FDI. A critical limitation of this study is the failure to account for feedback effects and resolve the issue of reverse causality and endogeneity bias, which future empirical studies could give some attention to.

Based on the findings, these results suggest that the sectorial target of Inward FDI stocks into the non-oil sector of Nigeria is needed to boost the sector's export, especially in the sub-sectors that can enhance the country's export diversification. Therefore, it is recommended that the Nigeria Authorities should embark on some policies that will create a favourable market for both domestic and foreign investors to invest in the non-oil sector of the country; such policies should create a reliable source of getting most of the intermediate inputs used for production domestically at a cheaper rate through value chain system, provision of essential social amenities

such as uninterrupted power supply, good transportation and information network, good security, proper accountability, good market price regulation and the likes. When all these are put in place, the cost of investment compared to its benefit will be low. These serve as incentives for the multinational companies to invest more in the sector, hence boosting the export and proceed of the sector (foreign earnings), strengthening the value of the Naira, diversifying the Nigeria economy from overdependence on oil proceeds to multiple means of earnings, automatically this will increase the economic growth and development of Nigeria.

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