TRADE COSTS AND BILATERAL TRADE FLOWS BETWEEN NIGERIA AND ITS MAJOR TRADING PARTNERS

BY

BASHIR ADELOWO, WAHAB
B.Sc (Economics) Ilorin, M.Sc (Economics) Ibadan
Matric No. 153374

A Thesis in the Department of Economics
Submitted to the Faculty of Economics and Management Sciences in partial fulfilment of the requirements for the Degree of

DOCTOR OF PHILOSOPHY

of the

UNIVERSITY OF IBADAN

MARCH 2021

CERTIFICATION

We certify that this research work was carried out by Bashir Adelowo Wahab under our supervision in the Department of Economics, University of Ibadan, Nigeria.

Professor Abiodun S. Bankole
Chairman, Thesis Supervision Committee
B.Sc (Econs) OAU, M.Sc, PhD (Ibadan)
Department of Economics
University of Ibadan
Nigeria

Professor Adeolu O. Adewuyi
Member, Thesis Supervision Committee
B.Sc (Econs), M.Sc, PhD (Ibadan)
Department of Economics
University of Ibadan
Nigeria

Dr. Solomon A. Olakojo
Member, Thesis Supervision Committee
B.Ed (Teacher Education (Econs/Geog)), M.Sc, PhD (Econs) (Ibadan)
Department of Economics
University of Ibadan
Nigeria

DEDICATION

This piece of work is dedicated to my Redeemer, God Almighty. To my lovely parents, my mother in particular. Alhaja Memunat Ayobami Wahab who first taught me as a child that it was important to go to school. It is also dedicated to my late Aunty, Mrs Iyabo Sinat Ajadi. May you be blessed with Ali-janat Firdouz (amen)?

ACKNOWLEDGEMENT

I ascribe all praise, honour and adoration to Almighty Allah for His guidance, providence and kindness. My God is dependable, in Him; I derive fullness of life and satisfaction (Ali-amdu-lilahi Robili-ala-mina). Once again, I thank Him for keeping me and making my dream a reality.

I am also very grateful to my thesis committee chair, Professor Abiodun Surajudeen Bankole. I thank you for mentoring and shaping this thesis from a rough idea to what it is today. Also, my heartfelt appreciation goes to my other supervisors; Professor Adeolu O. Adewuyi and Dr. Solomom A. Olakojo. Despite their tight schedules, they created time to read through my thesis and gave guidance towards enriching the work. Both their comments and suggestions have greatly shaped the research work into its current state. Sincerely, you have been very wonderful in my life. In particular, I appreciate Professor Adewuyi who took me to Professor Bankole and as well considered me as his supervisee. He was never relent in his effort over me. He initiated a weekend seminar for his Ph.D students which I was among. He conceived this idea with the aim of grooming and equipping us to have confident in the area of presentation, making comments and as well broaden our knowledge and understanding of issues. God bless you sir for all these efforts.

I also appreciate all academic and non-academic staff of the Department of Economics, University of Ibadan, for their various roles played towards the successful execution of the programme. Thank you very much and God bless you all.

I wish to express my sincere gratitude to my lovely parents especially my valuable mother and incomparable one, in person of Alhaja Memunat Ayobami Wahab for her spiritual, moral and financial supports in the completion of the programme, and my late father in person of Alhaji Wahab Adeyi. I wouldn't forget my wonderful wife (Hajia Suliat Eniola Oyinkansola) for her encouragement and spriritual support as well. Also, my younger sister and my loving daughters: Rashidat, Nanah-Ayisa, Nanah-Khadijah, Nanah-Awwah and Umul-Khair. You have all been wonderful to my life. I appreciate my mother-in-law, Alhaja Nanah-Khadijah Abdul-Ganiy, for her understanding, moral and spiritual supports. I pray Almighty Allah continues His blessing over you and your family.

I am deeply grateful to Mr. and Mrs. A. O. Ogunwale for their mentorship and spiritual assistance towards the successful completion of the programme. Not only this, but also that Baba Ogunwale was always taken his time to read through my thesis and made reasonable comments and suggestions that could improve the work. Sir, I cannot thank you enough. I am deeply thankful to Drs. Adeyinka Foluso, Daramola Adebukola and Pastor (Mr.) AkintolaOlalekan Akanji (NISER), Alfa Ridwan (Iyonu), Alfa Lukman Eiye-n-korin, Baba Jummy, Alfa Fulani, Pastor Azeez Adetayo and Baba Woli at Ogbomoso. These people have assisted spiritually. God bless you all. Many thanks go to my editor, Mr. Williams Azibaoguanasi from Department of Linguistics, University of Ilorin. Thank you for a good job done.

They are worth to be mentioned my wonderful finance, energy, environment and trade (FEET) group members. FEET group was organised by our supervisor, Professor Adeolu O. Adewuyi with the aim of strengthening and empowering his supervisees. The members have benefittedsignificantly from the group in the area of learning opportunities, critiques of members' research work and as well praying for members' success. Other group members include: Segun Adeboye, Sebil Oshota, Joseph Ogebe, Raheem Biodun, Muse Adeleke, Banji Awodumi, Ojo Olusegun and Azeez Badejo (late). God bless you all.

I appreciate African Economic Research Consortium (AERC) for giving me grant to carry out this research. Also, all the comments received at every stage of the study were appreciated. Finally, I acknowledge those whose names are not mentioned but in one way or the other contributed to the success of my programme. God bless you all.

ABSTRACT

Countries manipulate both domestic and international trade costs to promote their trade competitiveness in the global trade arena. High trade costs contributed to poor Nigeria's global trade shares in 2005 to 2016 (e.g. 2005 – 0.004, 2010 – 0.004 and 2016 – 0.002), resulting in its low competitiveness in international trade. Previous studies analysed the impact of elements of either Domestic Trade Costs (DTCs) or International Trade Costs (ITCs) on trade flows. This study was designed to examine the relative impacts of ITCs and DTCs on bilateral trade flows between Nigeria and its major trading partners.

A modified Heckscher-Ohlin Neo-classical Trade Theory incorporating trade costs as determinants of bilateral trade flows provided the framework. An augmented Standard Gravity Model that featured variables for ITCs (tariff, real effective exchange rate and maritime transport) and DTCs (ratio of road transport to total population, institutional quality, required number of documents, time and costs to export and import) was used. Panel instrumental variables method (pooled two-stage least squares technique leveraged on fixed and random effects models) in conjunction with fixed effects Poisson Pseudo Maximum Likelihood was used for analysis. Both aggregate and disaggregated (agricultural, manufactured and extractive goods) trade data for the 2005–2016periodwere analysed. Data were sourced from World Development Indicators, World Integrated Trade Solution, Worldwide Governance Indicators, and United Nations Conference for Trade and Development Statistics databases. All estimates were validated at $\alpha \leq 0.05$.

The results from the aggregate analyses reveal that Nigeria's export was promoted by own and trading partners' institutional quality (z=3.74, z=2.14), own and partners' ratio of road transport to population (z=2.70, z=2.72), while own institutional quality and ratio of road transport to population (z=2.51, z=4.11) promoted import. For Agricultural export, time to export in Nigeria (z=-2.51), Nigeria and trading partners' maritime transport (z=-3.17, z=3.84), and Nigeria and trading partners' institutional quality (z=4.07, z=2.47) had significant impact. For manufacturing export, time and cost to export a container in Nigeria (z=-3.15, z=-2.15),Nigeria's maritime transport (z=-3.22), and Nigeria and trading partners' ratio of road transport to population (z=-2.75, z=-2.00)had a significant negative impact, suggesting a poor state of infrastructures in Nigeria. For agricultural and manufacturing import, Nigeria's maritime transport (z=-6.51, z=-2.10), Nigeria's institutional quality (z=-4.26, z=-2.72), Nigeria's ratio of road transport to population (z=-6.48, z=-2.52) and time to import in Nigeria (z=-6.57 and z=-2.10) showed a significant negative impact. The differential impact ratio of DTCs components on aggregate, on the average, in agricultural, manufacturing and extractive exports constituting (57.5%, 63.5%, 74.0% and 62.0%)was higherthan the ITCs (42.5%, 36.5%, 26.0% and 38.0%), respectively. Also, the differential impact of DTCs components on aggregate in agricultural, manufacturing and extractive imports, accounting for 52.3%, 52.0%, 62.0% and 61.0%, was higher than the ITCs component (47.7%, 48.0%, 38.0% and 39.0%), respectively.

Domestic trade costs substantially affected the competitiveness of Nigeria's trade for the 2005-2016 period. Therefore, improvement in institutional quality, trade-related infrastructures,as well as regulatory environmentconducive to doing business, would produce significant trade gains for the Nigerian economy.

Keywords: Nigeria's Trade costs, Bilateral trade flows, Heckscher-Ohlinmodel, Gravity model.

Word count: 497

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.1 Preamble

Trade in an increasingly globalized and networked world enables countries to enlarge their consumption capacity, facilitates access to scarce resources not available locally at affordable prices and provides important stimulus to growth and development (Wilson, Mann&Otsuki, 2003; Todaro & Smith, 2004).International trade involves trade costs (Ali, 2016).Trading countriesare often faced with costs incurred apart from the marginal cost of producing the good itself(Anderson & van Wincoop, 2004). Such costs increase the prices of traded goods during the process of delivery from exporting (or producing countries) to importing countries, on the one hand, and from domestic producers to foreign consumers, on the other hand.

Trade costs are influenced by several factors such asdistance, policy barriers like tariffs and non-tariff barriers, communication barriers, unavailability of information, and unavailability of local distribution network. Other barriers include inadequate or inefficient legal and regulatory procedures to enforce contract[1]. At every stage of export or import process, exporters and importers incur trade costs, starting with cost of obtaining information about market conditions. Often, firms that sell their products to consumers in foreign markets are subjected to varying costs by foreign markets. These are also considered as trade costs (Portugal-Perez & Wilson, 2008). Trade costs have direct linkage with provision of public goods such as road infrastructure and social amenities such as communication, which is a function of government.

Trade in services also involves transaction costs (Organisation for Economic Cooperation and Development/World Trade Organisation (OECD/WTO), 2015)). For instance, in a pure cross-border trade that requires the use of the Internet, transport costs do not arise. Instead, issues relating to regulation or infrastructure investment

[1] These include costs that are related to language, currencies difference and colonial history among others.

may be required and these could generate friction. Services trade is therefore governed byseries of domestic laws and regulations in areas such as establishment of foreign companies, migration policies, and land ownership. These domestic regulations are common in sectors such as tourism, transport,professional services, education and banking(OECD/WTO, 2015).

Theoretically, there are two strands of arguments on how trade costs affect trade flows. The first strand of argument is that inefficient and inadequate local infrastructure and trade procedures lead to higher trade costs, thereby making imports more expensive while consumers move away from such imports towards domestic goods (Samuelson, 1952; Krugman, 1979, 1980). The second argument is thatinefficient cross-border trade procedures arising from the existence of variable and fixed costs of exporting make only productive firms to operate more efficiently in the export markets (Persson, 2010).[2]This is because the profitability of exports varies according to destination, as export to international markets with high patronage andassociated reduction in fixed and variable costs, generate more profits (Chaney, 2008).[3]

On the empirical side on how trade costs affect trade flows, Anderson and van Wincoop(2004) found that tariff barriers on trade-weighted average are less than 5 percent for developed countries. Their finding shows a lower average compared with developing countries, although with exceptions of a fewwithin the average of 10 to 20 percent.Inthe developing countries, trade costsassociated with tariff and non-tariff barriers remain considerably higher. Logistics services, poor state of infrastructure and malfunctioning transport system are other sources of trade costs that result to higher costs of transportation incurred by exporters and importers. All theseact as impediments to trade (Arvis, Duval, Shepherd & Utoktham, 2013).

In addition, high trade costs have adverse effect on economic performance of acountry enduring them. Consumers' welfare in such a country deteriorate through higher prices of both domestic and imported goods (Portugal-Perez & Wilson, 2008; OECD/WTO, 2015).Domestic producers are less competitive as intermediate inputs and technology

[2] The central message is that stringent or inefficient trade procedures bring about higher trade costs and, consequently,reduce trade.

[3]Each export destinationhas a productivitythresholdlevel that produces zero profits. A firm with greater productivity level than the threshold tend to operate efficiently in terms of exporting. Thus, only a subgroup of domestic firms tend to enter export markets because of varying characteristics.

usesourced outside the country are relatively more costly.As a result, their movement into the global value chainsis prevented (GVCs)(OECD/WTO, 2015).Nevertheless, trade costs remain a key factor explaining why some countries fail to grow and diversify.

1.2 Statement of the Problem

Nigeria's contribution to global export has not been satisfactory(United Nations Conference for Trade and Development (UNCTAD), 2017)).Nigeria's share of world exports over the last seven years peaked at 0.63 percent in 2011 and has since gradually dropped to 0.22 percent in 2016 (UNCTAD, 2017).This is lower compared with South Africa where share of world exportswas 0.48percentin 2016.Based on its record, Nigeria was placed 51ston the International Trade Centre's (ITC's) ranking of world exporting countries in 2016, while South Africa was ranked 38th. Nigeria's share of global import has been fluctuating over the years.It peaked at 0.3 percent in 2008 and steadily dropped to 0.27 percent in2012. Itincreased from 0.3 percent in 2013 to 0.32 in 2014 and again dropped to 0.24 percent in 2016 (UNCTAD, 2017).The country's share of exports ingross domestic product (GDP) between 2005 and 2016also averaged 21.8 percent. This was lower than those of its major trading partners[4], except Brazil, Japan and United States(World Development Indicators (WDI), 2018)).

Nigeria's poor performance in global tradeis essentiallyascribed to high and rising cost of trade arisingfrom trade policy barriers[5],poor trade-related infrastructure[6],borders-related or domestic regulatory barriers (World Economic Forum, 2016). Poor institutional quality (i.e., widespread corruption, low enforcement of rule of law,lack of sound regulatory environment, political instability and violence/terrorism, government ineffectiveness and unaccountability) is also often cited as

[4]Belgium (78.7 percent), Brazil (12.4 percent), China (27.5 percent), Cote d'Ivoire (46.1 percent), France (28.3 percent), Germany (43.4 percent), Ghana (30.5 percent), India (22.2 percent), Italy (27.2 percent), Japan (15.7 percent), Netherlands (75.2 percent), Norway (40.6 percent), Singapore (202.1 percent), South Africa (30.2 percent), Spain (28.3 percent), Sweden (46.2 percent), Turkey (22.3 percent), United Arab Emirates (86.4 percent), United Kingdom (27.6 percent) and United States (12.2 percent).

[5]Trade policy barriers include: tariffs, non-tariffs and exchange rates.

[6]Trade-related infrastructure comprises poor road networks,poor rail systems andpoor quality of port among others.

beingresponsible for the country's poor performance in global trade (Worldwide Governance Indicators (WGI), 2017)).

Nigeria's performance in global trade is still poor despite implementation ofunilateral, regional (Common External tariff (CET)) and multilateral trade liberalization agreements aimed at reducing tariff rate in the world economies including Nigeria.However, despite these steps, tariff rates[7] in Nigeria on primary products, manufactured products and all other products recorded double digits. These rates are considerably higher when compared withthose of its major trading partners,like Singapore (with zero percent tariff rate). France, Netherlands, Spain among othershave been maintaining single digit tariff rates over the years(WDI, 2016). High tariffsimpact adversely on trade, production and consumption patterns. Also, it worsen the welfare of both the citizens of the countries that impose them and their trading partners.High tariffsgenerate a wedge between local and global prices, whiledirecting demand towards substitutes produced locally.Thus, the trading partners are prevented from capturing gains associated with their comparative advantages (Kowalski, 2005).

Another component of trade policy barrier is exchange rate. High volatility in exchange rates in the country could induce uncertainty and create significant disincentive to investing.This induces higher trade costs in the country. In the economic literature, Peree and Steinherr(1989) and Bini-Smaghi (1991) argued that rising exchange rate volatility would reduce international trade. This is becuase there are risks and transaction costs associated with exchange rate variability, and thus reduce the incentives to trade.

Nigeria is also highly deficient in terms of trade-related infrastructure. The total core infrastructure stock is estimated at 20-25 percent of GDP. This is against the international benchmark of 70 percent of GDP. This low rate of infrastructuredevelopment has been driven historically by low public and private sectors' spending on infrastructure (National Planning Commission, 2015). Poor state of infrastructure in Nigeria constrains trading activities and, consequently, pushes up trade costs. Due to lack of efficient infrastructure services (paved roads, efficient rail system, efficient ports authority and better communication networks), Nigeria is being

[7]Simple average applied tariff, weighted average applied tariff and most favoured nation (MFN) applied tariff rates.

considered as one of the places where cost of trade greatly exceeds the value of the traded commodities (Foster & Pushak, 2011). This is because inefficient infrastructure services reduce the country's connections to distribution networks and global supply chains for producers, thus increasing trade costs, lowering value addition and reducing profitabilitypotential. Francois and Manchin (2007) found that telecommunications and transport infrastructure played a significant role in determining both export levels and the possibility of exporting. In the 2015-2016 Global Competitiveness Index, Nigeria received very poor assessment for its infrastructure and consequently ranked 133 out of 140 countries considered(World Economic Forum, 2016).

Similarly, prior to the trade facilitation agreement (TFA) in December 2013, Trading across Border indicators (TBI) reportrevealedthat trading in and out of Nigeria's borders requires far greater number of documents. According to World Bank (2015), for instance,9.1 documents are required when exporting and 13.4 when importing,as against 4 and 4, 3 and 3, 3.4 and 5.9required documents to export and import in Germany, Singapore and United Arab Emirates (UAE), respectively.Around the same period, the TBIalso reveals that it takes more time to ship a container from Nigeria to the rest of the world (26.4 days) or from the outside world to Nigeria (42.1 days), comparedwith major trading partners, especially Germany, Singapore and UAE with 8.3 and 7 days, 6 and 4, 8 and 8.1 days to export and import, respectively (World Bank, 2015). During TFA period, Nigeria still required 131 hours and 173 hours, equivalent to 5.46 and 7.21 days to export and import. This is considerably higher when compared withGermany, Singapore and UAE that required 1-1 hour, 2-3 hours and 6-12 hours to export and import(World Bank, 2018). More so, the cost required in Nigeria to export and import a unit of containerduring pre-TFA period averaged US$1,195.78 and US$1,408.83while US$250.00 and US$564.00during TFA period compared to relatively low costs required in Germany, Singapore and UAE.[8] The World Bank Logistics Performance Index(LPI) reveals the same pattern. In 2014, for instance,Nigeria scored 2.81 out of 5.This is lowerrelative to the world average of 3.07.[9] However, it became worse in 2016 as Nigeria had overall score of 2.63 and ranked 90 out of 160 countries.In general, all these impediments increase costs of

[8]See World Bank's Ease of Doing Business (http://www.doingbusiness.org/data).
[9] See http://lpi.worldbank.org/ for more details (accessed in April 2014).

trading, discourage exports and imports and harmingNigeria's competitivenessinternationally (Arvis *et al.,* 2014).

In addition, poor institutional quality associated with high levels of corruption, inefficient government, bureaucracy, inadequate enforcementof the rule of law to fight against abuse of public office and politically-motivated violence/terrorism or unstable government make international trade and investment more costlyin Nigeria. Also, the cost of accessing information and inconsistency in government policy decisions, high fees and charges (documents, automation, procedures) and general issues of customs are very critical in Nigeria. Generally, the foregoing issues coupled with corruption in the Nigerian custom services have not only posed devastating effects on Nigeria's trade performance but also on the growth of the whole economy. For instance, Nigeria's external trade during the first quarter of 2015 was estimated at $26.74 billion. This was lower compared with the values recorded in the preceding and corresponding quarters in 2014 by about 17.1 percent and 27.2 percent, respectively. Also,total merchandise exports dropped by 13.7 percent and 35.4 percent, from thevalues recorded during the fourth quarter of 2014 and also the first quarter of 2014 (Central Bank of Nigeria (CBN), 2014)). All these incidences perhaps culminate to the 2015-2016economic recession.

Against the above background, this thesis seeks to ask the following research questions: (i) what impact do domestic and international trade costs have on Nigeria's aggregate and disaggregatedexports to its major trading partners? (ii) What impact do domestic and international trade costs have on Nigeria's aggregate and disaggregated imports from its major trading partners? (iii) What impact ratio do different components of trade costs have on aggregate and disaggregated trade flows between Nigeria and its major trading partners?

1.3 Objectives of the Study

The broad objective of this thesis is to examine the impact of trade costs on bilateral trade flowsbetween Nigeria and its major trading partners. Specifically, this thesis seeks to:

1. determine the impact of domestic and international trade costs on Nigeria's aggregate and disaggregated exports to its major trading partners;

2. assess the impact of domestic and international trade costs on Nigeria's aggregate and disaggregated imports from its major trading partners; and
3. evaluate the differential impact ratio of DTCs and ITCs components on aggregate and disaggregated trade flows between Nigeria and its major trading partners.

1.4 Justification for the Study

The justifications for this thesis are derived from the gaps observed in the literature. A number of related theories existin the theoretical literature on the impact of trade costs on trade flows, among which are the heterogeneous firms trade theory (Melitz, 2003), simple "Iceberg" partial equilibrium model (Samuelson, 1952)**,** the Heckscher-Ohlin (H-O) and the specific factors (SF) trade models. Although heterogeneous firm trade (HFT) model explicitly analysed the issue of trade costs, it is mainly used for analysing firm-level exports. Assuming that aggregate exports of all firms in a country constitutetotal export of a country, the assumptions behind the HFT model might still not hold for an economy such as Nigeria that concentrates on a very narrow line of exports. H-O model often assumes free trade, while in reality, there is no free trade as there are transportation costs and other trade impediments among countries. This study therefore extends the H-O model in line with Sadikov (2007), but deviates from his specific factors model assumptions. This extension allows the inclusion of total trade costs (TTCs) into the H-O model by relaxing the assumption of free trade (absence of trade costs).TTCs in the context of this study is therefore defined as addition of international trade costs (ITCs) and domestic trade costs (DTCs). The rationale for this definition is because the existing theory (i.e., the H-O model) failed to capture the entire components of trade costs. The introduction of TTCs into the H-O model,disaggregated into ITCs and DTCs,forms part of the gaps that this study fills.

Methodologically, previous studies have utilized different estimation techniques with an overwhelming application of gravity model as the major functional method of analyzing drivers of trade flows. Gravity model has been estimated using different econometric techniques, largely influenced by the nature of the dependent variable used and the potential issues that crop up during estimation. For instance, Baier and Bergstrand (2001); Nordas and Piermartini (2004);Kee, Nicita and Olarreaga (2008); Duval and Utoktham (2012); Jalerajabi and Moghaddasi (2014) and Osnago,

Piermartiniand Rocha (2015), among others, used ordinary least square (OLS) technique to estimate gravity equation in its logarithmic form. However, the use of OLS renders the estimation inconsistent,particularly when there is heteroscedasticity.Portugal-Perez and Wilson (2008) and Hoekman and Nicita (2011), conversely, used the non-linear method of estimation, i.e., Poisson Pseudo Maximum Likelihood (PPML) as suggested by Santos Silva and Tenreyro (2006). While solving for endogeneity, De (2007), Korinek and Sourdin (2009) and Vidavong (2013), among others, estimated gravity equation using instrumental variables such as generalized least square (GLS), two-stage least square (2SLS) and Seemingly Unrelated Regression (SUR) techniques.Although these techniques offer solution to the problems of heteroscedasticity and endogeneity, they did not account for country specific effects.

Given the above, the current thesis employspanel instrumental variables (IV)estimator, preciselypooled two-stage least squares (2SLS) techniquebecause it helps to solve the problems of heteroscedasticity, endogeneity and at the same time account for heterogeneity problem leveraging on fixed and random effects models. Also, the pooled 2SLS estimator is designed for situations with few time periods and longer cross-sections.In addition, PPML and fixed effects PPML were used in a situation where there is presence of zero trade flows.

With respect to the indicators for measuring trade costs, different indicators have been adopted by different studies, although depending on the peculiarity of the economy or region under study. For instance, some studies have measured trade costs by mainly focusing either on trade policy barrier measures (tariffs and non-tariff measures such as quantitative restrictions, technical regulations and exchange rates); trade-related infrastructure (measured by quality of transport, time costs, shipping costs, communications infrastructure, port efficiency, port infrastructure quality, port congestion, water transport and transportation costs); border-related (domestic regulatory) measures (doing business index (DBI) and logistics performance indicators (LPI)); or institutional quality (measured by transparency and corruption). Majority of thestudies combined at most two indicators.For instance, Martinez-Zarzoso*et al.*(2007) and Arvis*et al.* (2015)combined trade related infrastructure (port container throughput) together with trade facilitation procedures (documents and time required to trade).

Francois and Manchin (2007) and Greenaway*et al.* (2009) combined institutional quality together with quality of transport and communications infrastructure, while Duval and Utoktham (2011b) combined trade policy barrier measures (tariff trade restrictiveness index (TRRI) and overall trade restrictiveness index (OTRI)) together with ease of doing business indicators.

This thesis, however,combined the four measures of trade costs identified in the literature, i.e.,trade policy barriers indicators; trade-related infrastructure measures, institutional quality measures and within-border-related (domestic regulatory) measures. The rationale for the inclusion of all these trade costs components is due to modification in the H-O model. This would enable disaggregate the impact of each component of trade costs on trade flows. This is becauseNigeria's peculiarity is reflected in each of the trade costs components.

Lastly, results of previous studiesappear to be uniform with overwhelming support for significant trade potential and welfare gains associated with trade costs reduction.[10]However,Bougheas*et al.* (1999) showed that there could be welfare loss associated with increased volume of infrastructure. In Sub-Saharan Africa (SSA) region, a handful of studies have investigated trade costs-trade flows nexus (Portugal-Perez & Wilson, 2008; Adewuyi & Bankole, 2012; Ackah *et al.,* 2012; Deen-Swarray*et al.,* 2012; Ackah *et al.,* 2013 and Hoppe*et al.,* 2013).With these number of studies, only Adewuyi andBankole (2012) and Hoppe*et al.* (2013) can be identified in the case of Nigeria, in which the former used only tariffs while the latter used regulatory and security barriers as trade costs measures. However, none of these studies considered both ITCs and DTCs.The present studyfills the gaps by examining the impact of both ITCsand DTCs on trade flows between Nigeria and its major trading partners.In addition, the study is also premised on investigating empirically how the modification made in the theory is important in understanding the impact of trade costs on Nigeria'strade flows. Clearly, such knowledge is potentially insightful

[10]OECD (2003), Bernard, *et al.* (2006), Jacks, *et al.* (2010), Lawless (2010), Miroudot, *et al.* (2011), Miroudot, *et al.* (2013), De (2007), Dennis and Shepherd (2007), Shepherd (2009), Portugal-Perez and Wilson (2008a-b), Brooks and Ferrarini (2010), Hoekman and Nicita (2011), Khan and Kalirajan (2011), Arvis, *et al.*(2013), Gaytaranov, *et al.* (2013), Arvis, et al.(2015), Ezzat (2015), Singh, et al. (2015), Singh and Mathur (2016), Francois and Manchin (2007), Martinez-Zarzoso, *et al.* (2007), Greenaway, *et al.* (2009), Duval and Utoktham (2011b) and Ackah, *et al.*(2012) among others.

as it will aid researchers, help policy formulation and promote active participation among stakeholders and government agents.

1.5 Scope of the Thesis

This thesis focuses on Nigeria and its major trading partners during the 2005-2016 periods. Twenty countries constitute Nigeria's major trading partners[11]. These countrieshave been consistent with Nigeria, maintaining a significant bilateral trade relation with the country for over the past decade.The volume of trade between Nigeria and itspartners forms the total volume of trade used for this study. The concept of trade costs is wide in scope, especially,in terms of indicators or measures. Costs analysis could be measured directly (quantifiably) and indirectly (non-quantifiably).This thesis focuses only on the quantifiablemeasuresbecause of unavailability of data on non-quantifiable measures. The quantifiable measure of trade costs considered include required number of documents, time and cost (US$) per container as contained in the ease of doing business index (DBI).Other trade costs indicators include institutional quality measures (control of corruption,rule of law, regulatory quality, political stability and absence of violence/terrorism), trade policy barriers measures (tariffs and exchange rate) and trade-related infrastructure measures (ratio of total roads network to total population and maritime transport).This thesis isalso limited to merchandise trade due to unavailability of data on bilateral services trade.The choice of the selected years is motivated by data availability.Finally, the impact of trade costsis analysed at both aggregate and sectoral levels.

1.6 Organisation of the Study

Apart from this introductory chapter,the rest of the study is organised into five chapters. A detailed review of literature on the impact of trade costs on trade flows has been undertaken in chapter two. Under this chapter, the background to the study which is subdivided into three sub-sections is presented. The first sub-section dwells on the comparative analysis of trade costs components between Nigeria and its major trading partners, the second presents the analysis of trade flows between Nigeria and its trading partners, while the third sub-section discusses trade policy to address trade costs issue.Besides, the chapter reviewed the theories, methodologies (comprises of

[11]Belgium, Brazil, China, Cote d'Ivoire, France, Germany, Ghana, India, Italy, Japan, Netherlands, Norway, Singapore, South Africa, Spain, Sweden, Turkey, UAE, UK and US.

measures of trade costs and methods of analysis adopted) and empirical literature.Chapter three consists of the theoretical framework and methodology. Chapter fourpresents empirical analysis, i.e., presentation and discussion of results based on the two objectives of the study. Lastly, chapter five provides summary, conclusion, contribution to knowledge and policy recommendations,as well as the limitation(s) of the study. Areas of future research were also suggested.

CHAPTER TWO

BACKGROUND AND LITERATURE REVIEW

2.0 Introduction

This chapter describes in a comparative manner the analysis of trade costs between Nigeria and its major trading partners with respect to its various indicators. The chapter also analyses the trade flows of these trading partners with emphasison Nigeria's merchandize exports to all trading partners, Nigeria's merchandize imports from all trading partners, commodity structure of Nigeria's exports to its major trading partners,commodity structure of Nigeria's imports from its major trading partners, product analysis of Nigeria's exports and imports and sectoral analysis of Nigeria's exports and import. In addition, the chapter discusses trade policy in Nigeria. In this chapter, the theoretical, methodological and empirical review of literature on trade costs and trade performance relationship are also documented.

2.1 Overview of Trade Costs and Bilateral Trade Flows between Nigeria and Its Trading Partners

2.2 Comparative Analysis of Trade Costs in Nigeria and its Trading partners

Nigeria ranked 6th among the fastest growing economies in the world after China, Philippines, Kenya, India and Indonesia (International Monetary Fund (IMF), 2015)). The country achieved this feet with a growth rate of 6.3 percent. With this, it jumped into the double digit growth typical of the Asian tiger economies. This growth is regardless of financial crisis, chronic power shortage, lack of strong contribution from the non-oil export trade regime and global economic meltdown. Despite the huge wealth of human and material resource endowment of Nigeria, and the liberalization of sectors such as Banking and Telecom is yet to facilitate trade significantly in the country compared to its major trading partners. In the 2015 doing business report, Nigeria has a distance to frontier (DTF) score of 47.33 out of 100, far behind Belgium (71.11), Brazil (58.01), China (62.58), Cote d'Ivoire (52.26), France (73.88), Germany

(79.73), Ghana (65.24) India (53.97), Italy (68.48), Japan (74.80), Netherlands (75.01), Norway (82.40), Singapore (88.27), South Africa (71.08), Spain (73.17), Sweden (80.60), Turkey (68.66), UAE (76.81), UK (80.96) and US (81.98). This indicates that Nigeria is 52.67 percentage points away from the frontier constructed from the best performances across all countries and across time. In the same vein, Nigeria scored 2.63 out of maximum of 5, hence ranked 90th out of 160 countries in LPI. Also, in the Global Competitiveness index, Nigeria fell to 124th (2016)from 120th (2014) out of 140 countries. Moreover, it scored 27 points out of 100 on the 2017 Corruption Perceptions Index (CPI) reported by Transparency International (TI), and thus ranked 148th out of 180 countries.

Apart from poor and non-availability of favourable and conducive environment to thrive business operations, which are all associated to high costs of trading mentioned above, Nigeria is currently faced with infrastructure deficit. Non-compliance with the law has also been a challenge. Many importers and ports operators feel reluctant to comply with ports regulations. This does not only constitute a hindrance to those that want to do business legitimately, but also a serious obstacle to smooth trade facilitation in Nigeria. The next sub-section discusses issues associated with trade costs between Nigeria and its major trading partners.

2.2.1 Trade Policy Barriers measures for Nigeria and its Trading Partners

2.2.1.1 Simple Average Tariffs Rates

The subsection shows the behaviour of tariffs as an indicator of trade policy barrier measures of trade costs. Figure 2.1a, 2.1b and 2.1c show that tariff rate based on simple averagefor all products, manufactured and primary products for Belgium, Brazil, China, Cote d'Ivoire, France, Germany, Ghana, India, Italy, Japan, Netherlands, Nigeria,Norway, Singapore, South Africa, Spain, Sweden, Turkey, UAE, UK and US over the period of 1990 to 2016.

As revealed in Figure 2.1a, Nigeria's simple average tariff rate for all products has not only been fluctuating but also high. For instance, average tariff rate stood at 28.02 percent in 1990, but rose to 101 percent in 1995.It dropped steadily to 23 percent in 1996 up to 1998 and rose again to 24.7 percent in 2000. Nigeria also recorded a

downward trend in its simple average tariff rate from about 25.17 percent in 2002 to 10.55 percent in 2005 and 11.06 percent in 2010, but rose again to 12.44 percent in 2016. Despite a significant decrease in its tariff rates over time, Nigeria's simple average tariff rateremains double digits compared withEuropean Union partners, which has single digit and uniform tariff rate of 6.12 percent, 2.3 percent, 1.89 percent and 2.48 percent in 1990, 2000, 2010 and 2016, respectively. The uniform tariff rate imposed by these countries is the outcome of the Treaty establishing the European Economic Community (EEC). The uniform tariff rate is based on the international Nomenclature of the Harmonised System (HS Nomenclature) and the Combined Nomenclature (CN)of the European Union (UN). Similarly, Japan, Norway, Turkey, UAE and US maintained single digit tariff rates during these periods. The same could be said of South Africa since 2000 and China since 2005. However, Brazil, Cote d'Ivoire, Ghana and India have been recording double digit tariff rates over time, except for the periods 2014-2016 when India maintained 8.78 percent on average, unlike Brazil which still maintained 13.65 percent on average. In contrast to all these countries, Singapore's tariff rate over the same period is less than 1 percent.

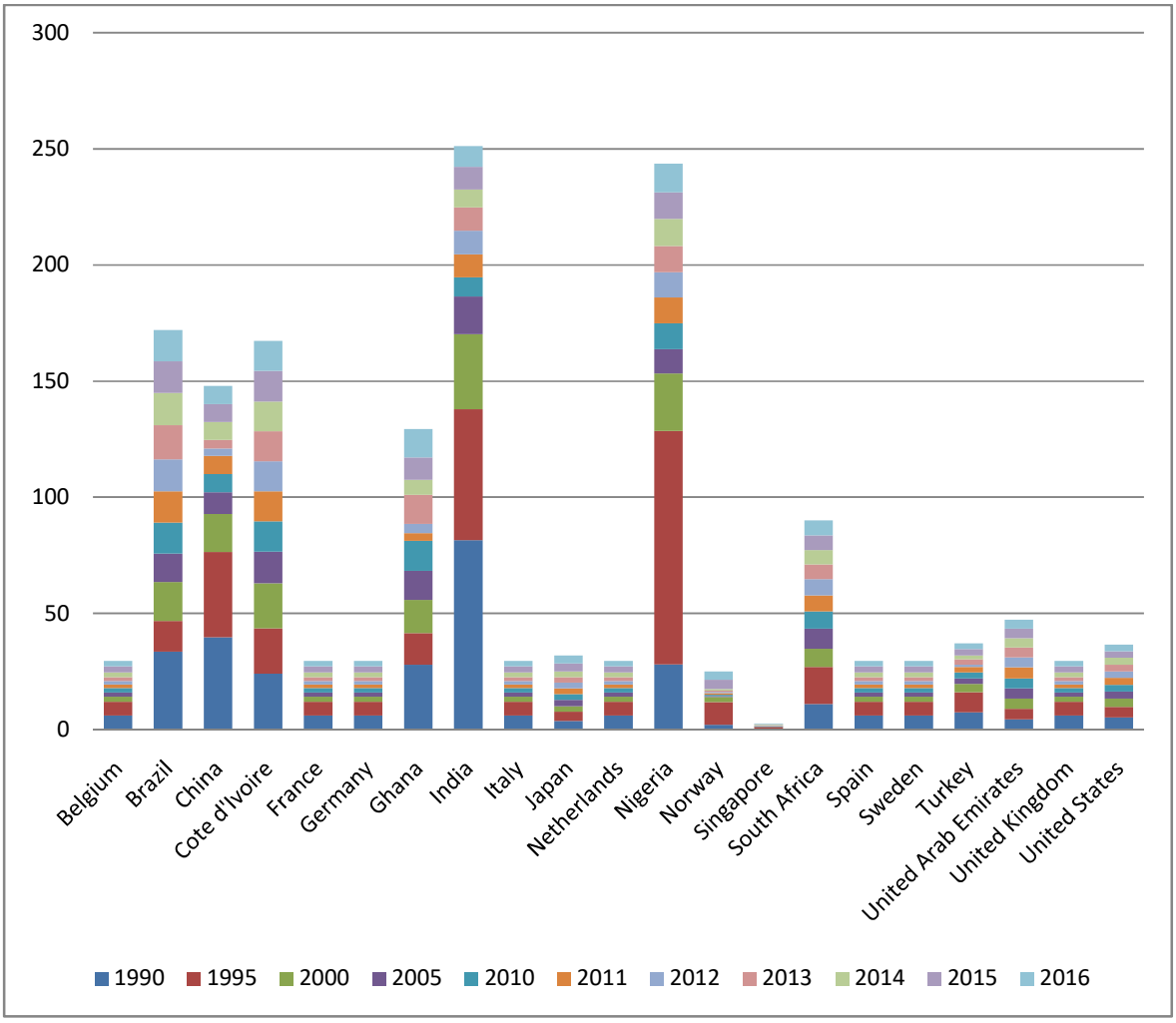


Figure 2.1a: Trend of Simple Average Tariff Rate (%) for all Products for Nigeria and Trading Partners, 1990-2016

Source: World Development Indicators, 2018.

Figure 2.1b shows that simple average tariff rates for manufactured productsin Nigeria has been fluctuating and as wellhigh. Nigeria recorded double digits on simple average tariff rates for manufactured products over the period, though the tariff rate reduced drastically from 101 percent in 1995 to 24.2 percent in 2000. The tariff rate was further reduced to 10.81 percent in 2010.This reduction could be attributed to the effort of the Federal Government towards eliminating quantitative restrictions and liberalisation of tariff in Nigeria following the implementation of CET. In 2013, simple average tariff rates for manufactured products rose again to 11.1 percent and stood at 12.14 percent in 2016. However, China has been recording single digit tariff rate since 2004 while India since 2008. During the periods covered in the Figure, Singapore maintained zero percent tariff rate for manufactured products, except in 1990 when it recorded 0.44 percent.

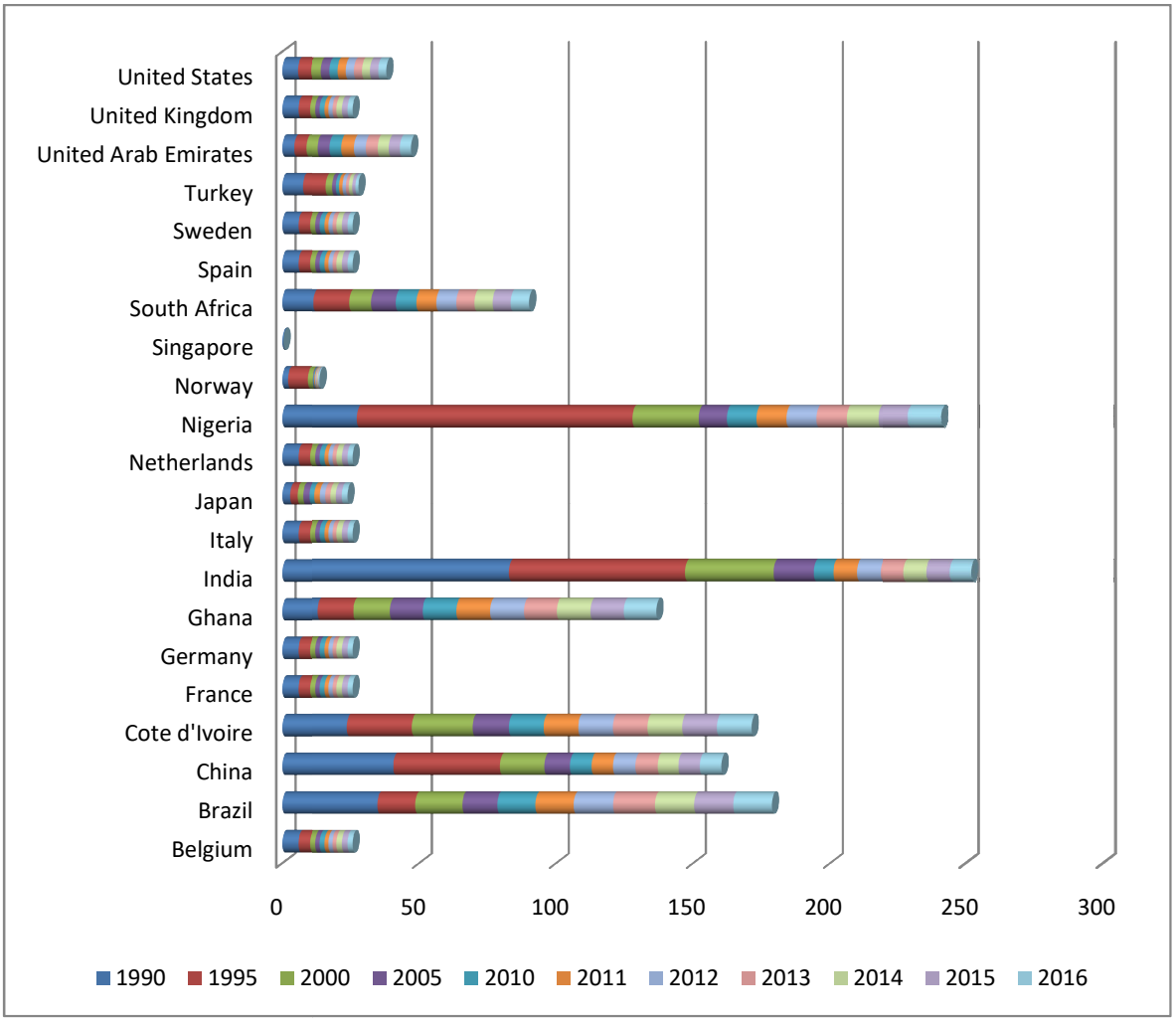


Figure 2.1b: Trend of Simple Average Tariff Rate (%) for Manufactured Products for Nigeria and Trading Partners, 1990-2016
Source: World Development Indicators, 2018.

Figure 2.1c, on the other hand, showsthat simple average tariff rates for primary products in Nigeria decreased significantly but still remained double digits. For instance, tariff rate reduced persistently from 101 percent in 1995 to 28.5 percent in 2000, 12.83 percent in 2005 and 12.78 percent in 2010. However, in 2012, it rose to 14.97 percent but dropped marginally to 14.83 percent in 2016. This is still high when compared with European countries and other trading partners (Japan, Norway, Turkey and US) which have been maintaining single digit average tariff rates for both primary products(as well as manufactured products) since 1990. However, as indicated in Figure 2.1c, South Africa maintained single digit tariff rates for only primary products all through. In the same vein, Brazil and China has been recording single digit tariff rates for primary products since 2004. These countries contrast Singapore which has been recording less than 1 percent tariff rate for primary products.

In summary, all three Figures show that simple average tariff rates for all products, manufactured and primary products are very high in Nigeria, far above what obtains forsome of its trading partners in the world, even though Nigeria is better than India in all categories of products. What constituted the double digits high tariff rates in Nigeria may be due to a number of additional duties on imports? The double digits high tariff rate may also be due to some irregularities in taxes on imported goods and domestically produced goods. Generally, high tariff rate is an indication of high trade costs in Nigeria.

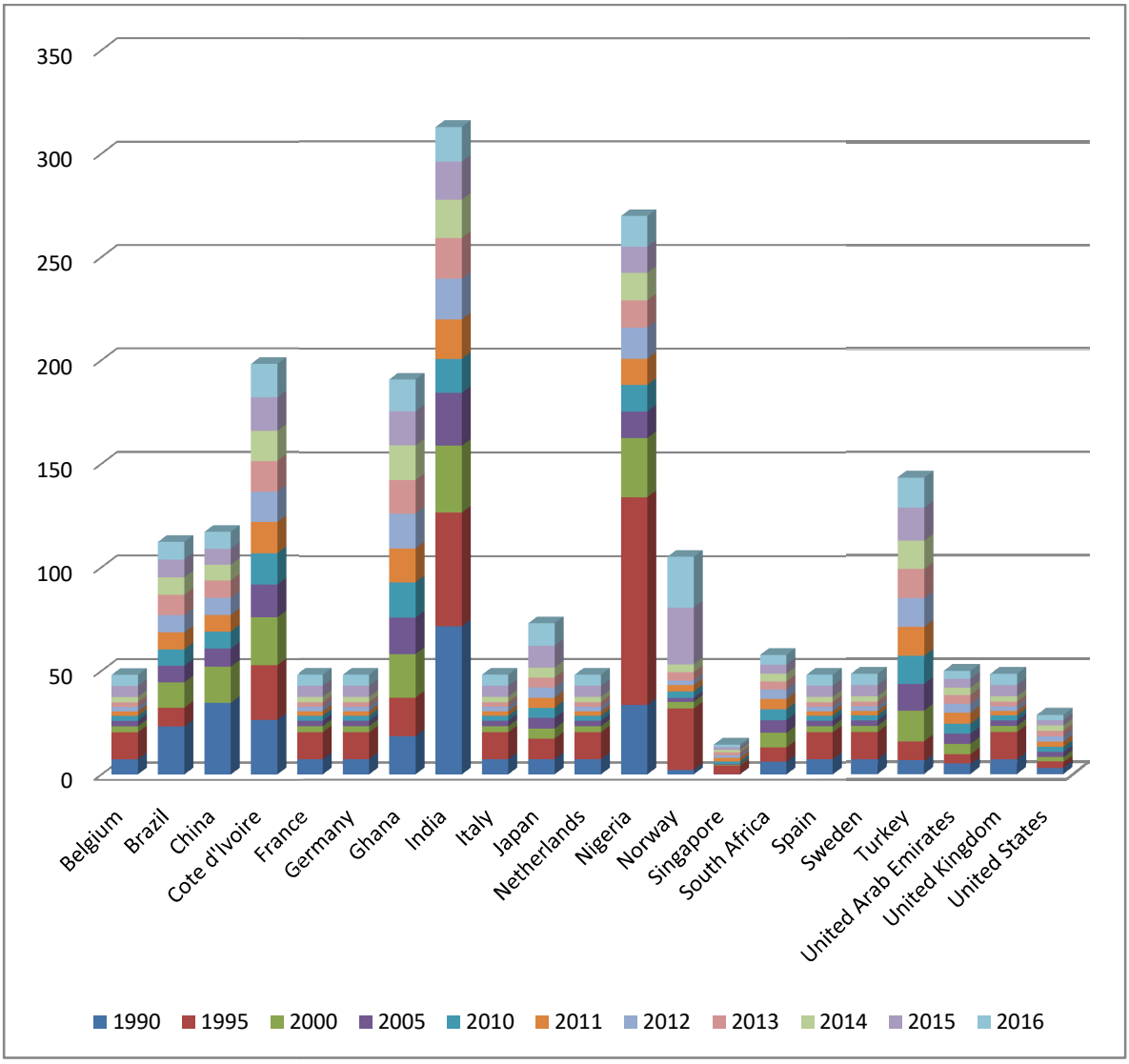


Figure 2.1c: Trend of Simple Average Tariff Rate (%) for Primary Products for Nigeria and Trading Partners, 1990-2016
Source: World Development Indicators, 2018.

2.2.1.2 Real Effective Exchange Rates

Apart from tariffs, real effective exchange rate (REER) is another trade policy barrier measure. REER is mostly used when a country has many trading partners. It represents the weighted average of a country's currency relative to a basket of other major currencies. The weights are determined by comparing the relative trade balance of a country's currency against each country within the index.It is measured as the nominal effective exchange rate adjusted for relative price differentials between home (Nigeria) country and its major trading partners. A nominal effective exchange rate index is the ratio (expressed on the base 2010 = 100) of an index of a currency's period-average exchange rate to a weighted geometric average of exchange rates. An increase in REER represents appreciation ofdomestic currency, thus implies higher trade costs, while a decrease in REER represents depreciation. The latter is associated with lower trade costs.

Table 2.1 shows the trendof Nigeria's REER together with that of its major trading partners over the period 2005 to 2016. Between 2005 and 2009, Nigeria experienced serious fluctuation in REER. During these periods, its REER depreciated significantly and far below those of major trading partners, except Brazil.In 2007, for instance, it depreciated relative to all its major trading partners except Brazil, China and Japan.However, between 2007 and 2008, it appreciated by about 10.7 percent but depreciated again in 2009 by 7.3 percent, far belowmostof its major trading partners except Brazil, India, South Africa and Turkey.In 2010, Nigeria together with its major trading partner all maintained a constant REER index. However, from 2011 up to 2014, Nigeria's REER appreciated again and surpassed those of its major trading partners except UAE. Finally, from 2015 to 2016, it continually depreciated though ahead of those its trading partners except China, UAE and United State.

Table 2.1:Trendof Real Effective Exchange Rate for Nigeria and Trading Partners,2005-2016

Country Name	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Belgium	99.10	98.77	99.83	103.24	103.16	100.00	101.07	98.92	100.51	99.95	95.48	98.24
Brazil	70.94	79.16	85.08	88.89	88.11	100.00	103.50	93.16	87.91	87.08	73.40	78.29
China	84.16	85.65	89.11	97.04	100.56	100.00	102.93	108.62	115.44	119.01	131.08	123.77
Cote d'Ivoire	100.79	99.94	101.90	106.76	106.37	100.00	102.01	97.98	102.36	103.39	99.02	99.25
France	101.11	100.80	101.67	103.08	103.01	100.00	99.48	96.50	97.82	97.37	92.69	93.53
Germany	102.65	101.96	103.90	104.51	105.02	100.00	99.22	95.75	98.27	98.84	93.67	94.83
Ghana	102.16	107.67	107.03	101.97	93.65	100.00	95.05	87.42	88.03	68.31	69.35	79.05
India	84.15	83.52	90.23	85.45	87.92	100.00	100.18	95.5	94.4	96.07	103.81	105.02
Italy	100.46	100.18	101.15	102.70	103.72	100.00	100.10	98.33	100.06	99.75	95.35	95.89
Japan	97.32	88.16	81.03	87.79	98.77	100.00	101.71	100.57	80.35	75.20	70.31	79.70
Netherlands	100.87	99.83	100.75	101.91	103.65	100.00	99.63	97.05	100.04	100.18	96.16	97.40
Nigeria	85.34	90.61	89.69	99.25	92.00	100.00	100.35	111.57	119.02	127.46	126.63	116.21
Norway	97.21	97.12	97.71	97.80	95.09	100.00	100.61	100.34	98.97	94.18	86.48	86.55
Singapore	89.70	91.00	91.64	96.69	96.59	100.00	105.54	110.46	113.44	113.11	110.92	109.84
South Africa	102.36	97.03	90.59	79.57	86.63	100.00	97.97	92.78	83.04	77.91	77.50	72.03
Spain	96.29	97.82	99.65	102.48	102.41	100.00	100.69	98.50	100.24	99.09	94.50	95.13
Sweden	104.54	104.05	105.68	103.62	93.32	100.00	106.24	105.83	107.07	101.11	94.35	94.69
Turkey	89.86	89.05	96.36	97.11	91.31	100.00	88.38	91.43	90.29	85.52	83.59	82.03
United Arab Emirates	84.78	103.42	114.24	125.78	108.67	100.00	112.06	121.57	121.64	128.24	132.76	128.52
United Kingdom	121.51	122.50	124.38	108.78	97.70	100.00	100.66	105.26	104.08	110.87	117.70	104.76
United States	109.31	108.70	103.65	99.62	103.96	100.00	95.10	98.05	99.17	101.30	114.10	117.77

Source: World Development Indicators, 2018; Global Economic Monitor (GEM), 2017 and UNCTAD, 2017.

2.2.2 Trade-related Infrastructure measures in Nigeria and Trading Partners

2.2.2.1 Current State of Infrastructure in Nigeria: A Comparative Picture

Infrastructure deficit is unarguably a major challenge in Nigeria. Key infrastructures such as roads, railway networks, ports and internet facilities are inadequate (WDI, 2018; UNCTAD, 2017). Most of the available ones are also in bad shape. Poor transport infrastructure tends to constrain businesses.This could also lead to high cost of transportation, which could have some spillover effects on trade. Therefore, high transport costs and the time of delivery of commodities could affect the competitive position of a country. In other words, infrastructure deficiency reducescountry's products competitiveness in the global market.

In the 2015-2016 Global Competitiveness Report, infrastructure is cited as one of the twelve pillars essential for a country to compete favourably.Out of 140 countriessurveyed, Nigeria was placed 124th.This puts Nigeria far behind all its major trading partners. In terms of quality of infrastructure, Nigeria ranked 133 out of the 140 countries surveyed. Belgium, Brazil, China, Cote d' Ivoire, France, Germany, Ghana, India, Italy, Japan, Netherlands, Norway, Singapore, South Africa, Spain, Sweden, Turkey, UAE, UK and US occupied 21st, 74th, 39th, 85th, 8th, 7th, 115th, 81st, 26th, 5th, 3rd, 31st, 2nd, 68th, 10th, 20th, 53rd, 4th, 9th and 11th positions, respectively(World Economic Forum, 2016).Therefore, an analysis of how the current state of infrastructure contributes to high costs of trading for Nigeria relative to its major trading partners is imperative.

Total roads network to total population, volume of goods transported by rail (millionton-km), number of internet users per 100 people, container port traffic(measured by 20-foot equivalent units (TEUs)) and maritime transport(measured by liner shipping connectivity index)are some of the indicators used to explain the state of infrastructure in Nigeria.

2.2.2.1.1 Roads

Total road network(both paved and unpaved) comprises of motorways, highways, and main or national roads, secondary or regional roads, and all other roads in a country. Figure 2.2 depicts the ratio of total roads network to total population for Nigeria and

same for its major trading partners. The figure clearly shows that Nigeria's stock of road network is very low compared with its increasing population. Although Nigeria experienced an increase in the ratio of total roads network to total population between 1990 and 1999, the ratio was lower when compared with its trading partners for the same period. For instance, Nigeria's population increased from about 95 million in 1990 to 120 million people in 1999 (about 26.3 percent increase) while the total available roads network increased from 122,000 km to 194,394 km (recorded about 59.3 percent increase) around the same period. The estimated ratio increased from 0.001 in 1990 to 0.002 in 1999.

This ratio is extremely low compare with that of its major trading partners, except Singapore and UAE. In 2000, total roads network fell to 193,200 km (accounted for about 0.62 percent decrease) but total population still remain higher as it increased to 123 million (about 2.5 percent increase) from the previous year. Consequently, ratio of total roads network to total population in Nigeria remain lower. The country recorded 0.002 in 2000, but dropped to 0.001 in 2002 through 2016. The drop was relative to most of its trading partners including China which has been recording 0.003 since 2004 up to 2016.The lower ratio may be due to the fact that Nigeria's population increased steadily by 37.2 percent from about 129 million in 2002 to 186 million in 2016(WDI, 2017). However, there was never a corresponding increase in the total available road networks in the country. With respect to road quality, Nigeria has also performed poorly.

Paved roads remained very low. They accounted for about 15 percent between 2000 and 2009 and about 18 percent from 2010 to 2016. In France, Germany, Italy, Singapore, UAE and UK, paved roads accounted for 100 percent; in Spain, Netherlands, Belgium, US, India, China, Turkey, Japan and Norway, they accounted for 99, 90, 78.2, 67.4, 57.3, 53.5, 88.7, 80.1 and 80.7 percents, respectively.

The low ratio of total road networks to the population has created a great burden on the available roads in the country and thus resulted to high transportation and delivery costs for both producers and consumers.

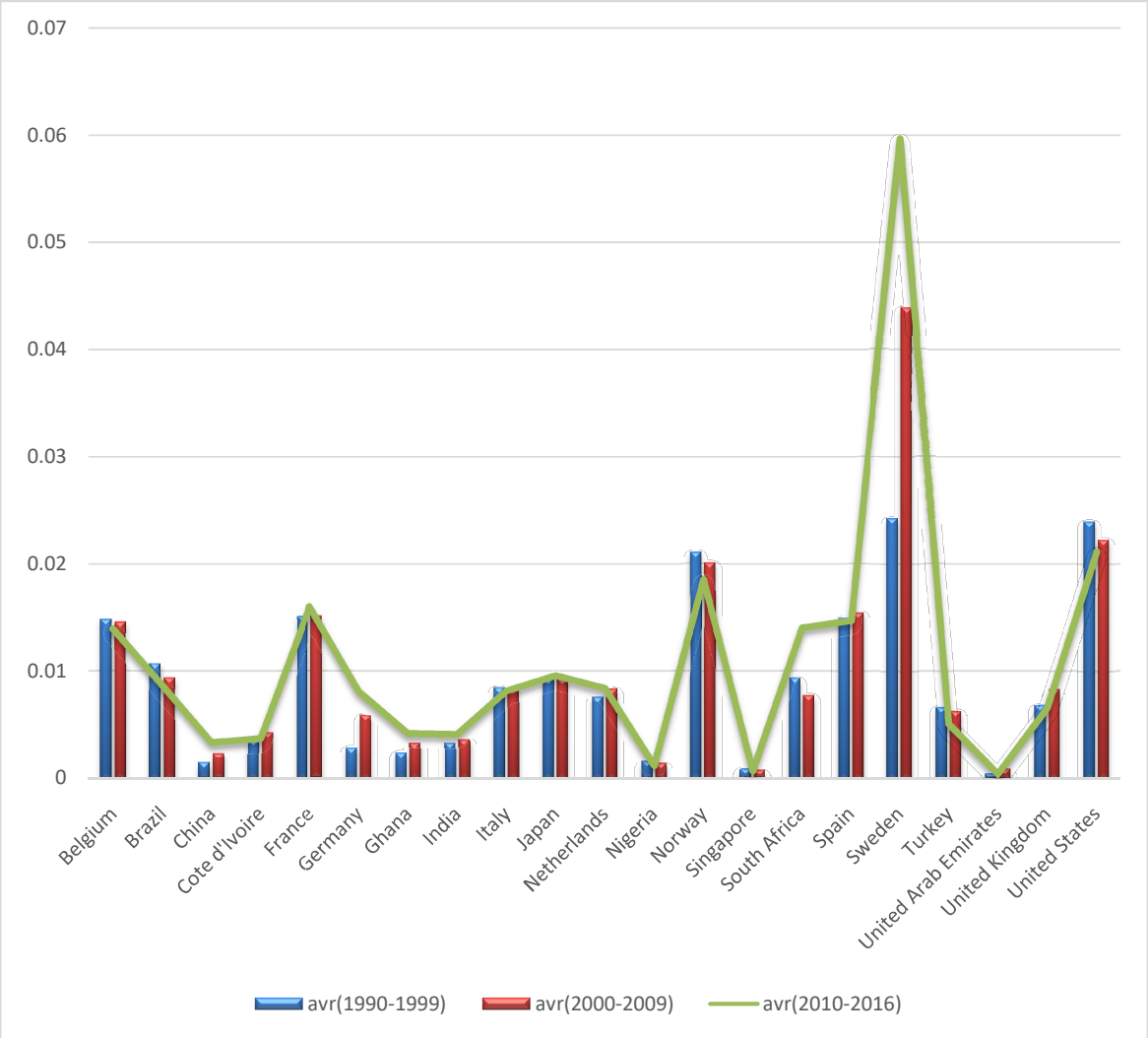


Figure 2.2: Ratio of Total Roads Network to Total Population for Nigeria and major Trading Partners, 1990-2016

Sources: Author's Computation based on data from WDI, 2012, 2017; National Planning Commission, 2015; and Road Statistics Yearbook, 2016.

2.2.2.1.2 Railways

A performance indicator of railway network is volume of goods transported. This is measured in metric tons multiplied by kilometres travelled. Overtime, Nigeria's railway has recorded a great decline in the volume of goods transported. The trend as shown in Figure 2.3 reflects a substitution effect,i.e., use of rail network to alternative networks (roads). Between 1991 and 1997, there has been a drastic reduction from 330thousand ton-km to 270thousand ton-km (about 18.2 percent decreases) of goods transported by railway. In 1998, there was greater improvement by 1,513 thousand ton-km in the previous year. This represented about 460.4 percent increase. However, in 1999, there was significant decline. The decline continued steadily up to 2009 with about 52 thousand ton-km. Transportation slightly rose to 138 thousand ton-km in 2010 and 341 thousand ton-km in 2011, but dropped to 161 thousand ton-km in 2015.

Generally, the low volume of goods transported is closely linked to erratic rail transport services, non-functional rail tracks, dilapidated and vastly underutilised railway system.The implication is that consumers have shifted to roads as substitute. Unfortunately, road transport in Nigeria commands a higher unit cost than rail. This also has an incremental effect on cost of trading, and cost of goods and services in the country.

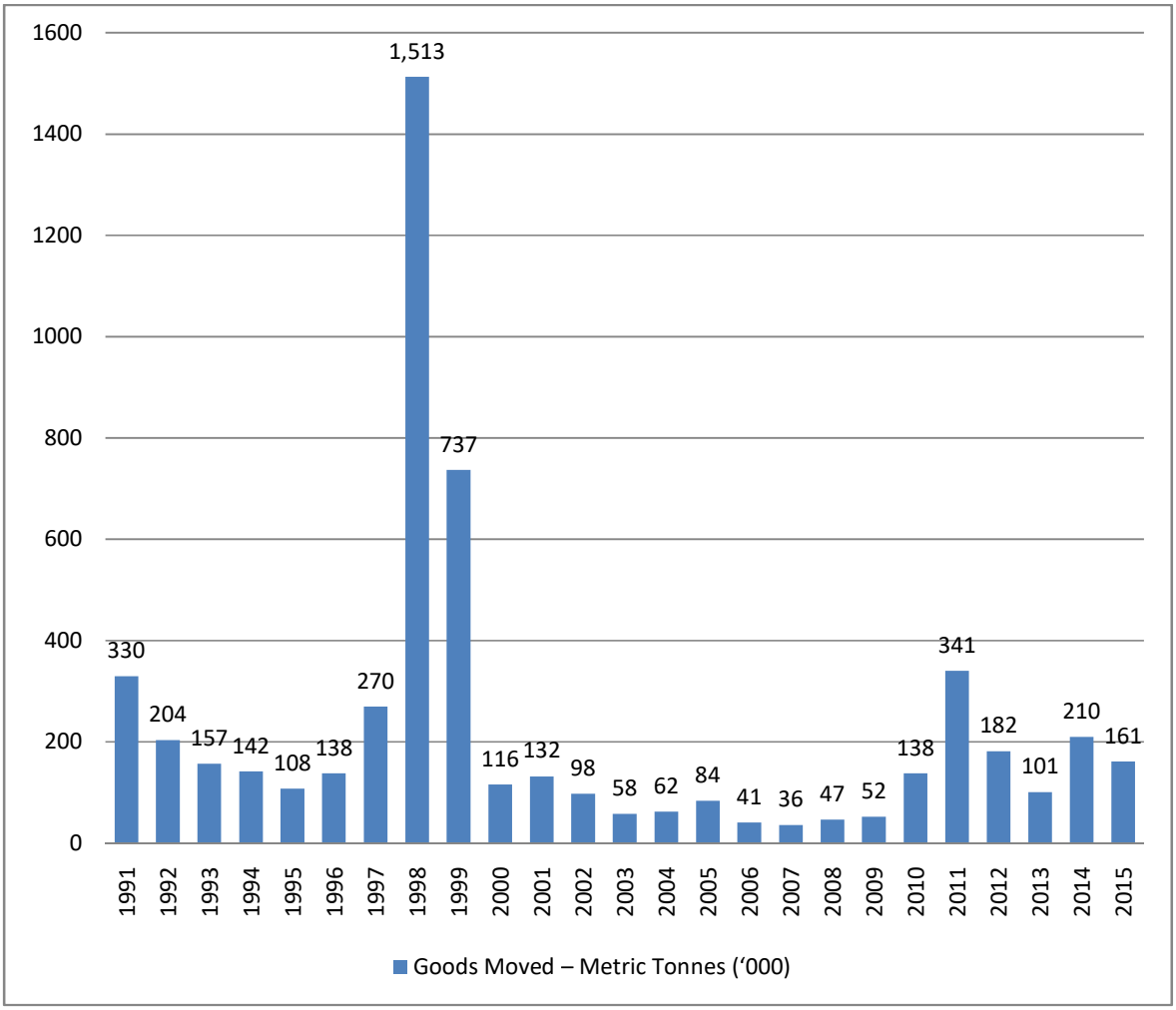


Figure 2.3: Trend of Goods Transported by Rail in Nigeria (thousand ton-km), 1991-2015

Source: Nigerian Railway Corporation Annual Reports (Several Years) and Abioye *et al.* (2016).

2.2.2.1.3 Internet users

Internet users are individuals who can access the Internet.The number of internet users per 100 people in Nigeria between 1996 and 2016 is low compared to the total population. In Figure 2.4,Internet users per 100 people between 1996 and 2001 range between 0.01 and 0.09. Between 2002 and 2003, it increased to about 0.32 and 0.56, respectively. The low proportion of Internet users during these periods was due to insufficient availability of the Internet. In 2004, Internet users increased to 1.3 per 100 people. The trend continued till 2009 with 9.3 per 100 people. As at 2010, Internet users per 100 people increased, reaching 11.5. The increasecontinued steadily to25.7 per 100 people in 2016.

Consequently, Internet adoption rate in Nigeria is still very low(close to 75 percent of the population are offline. This may be ascribed to high poverty rate, higher access costs, low quality of technologies and poor state of infrastructure, particularly in rural areas (Meltzer, 2016). A lack of access to Internet hinders the adoption of digital trade, thus making doing business internationally more difficult, slow and more expensive. Similarly, acquiring information across national borders becomes very costly since searching costs and costs of entering a new market become higher. All these constitute significant reduction in volume of trade in Nigeria.

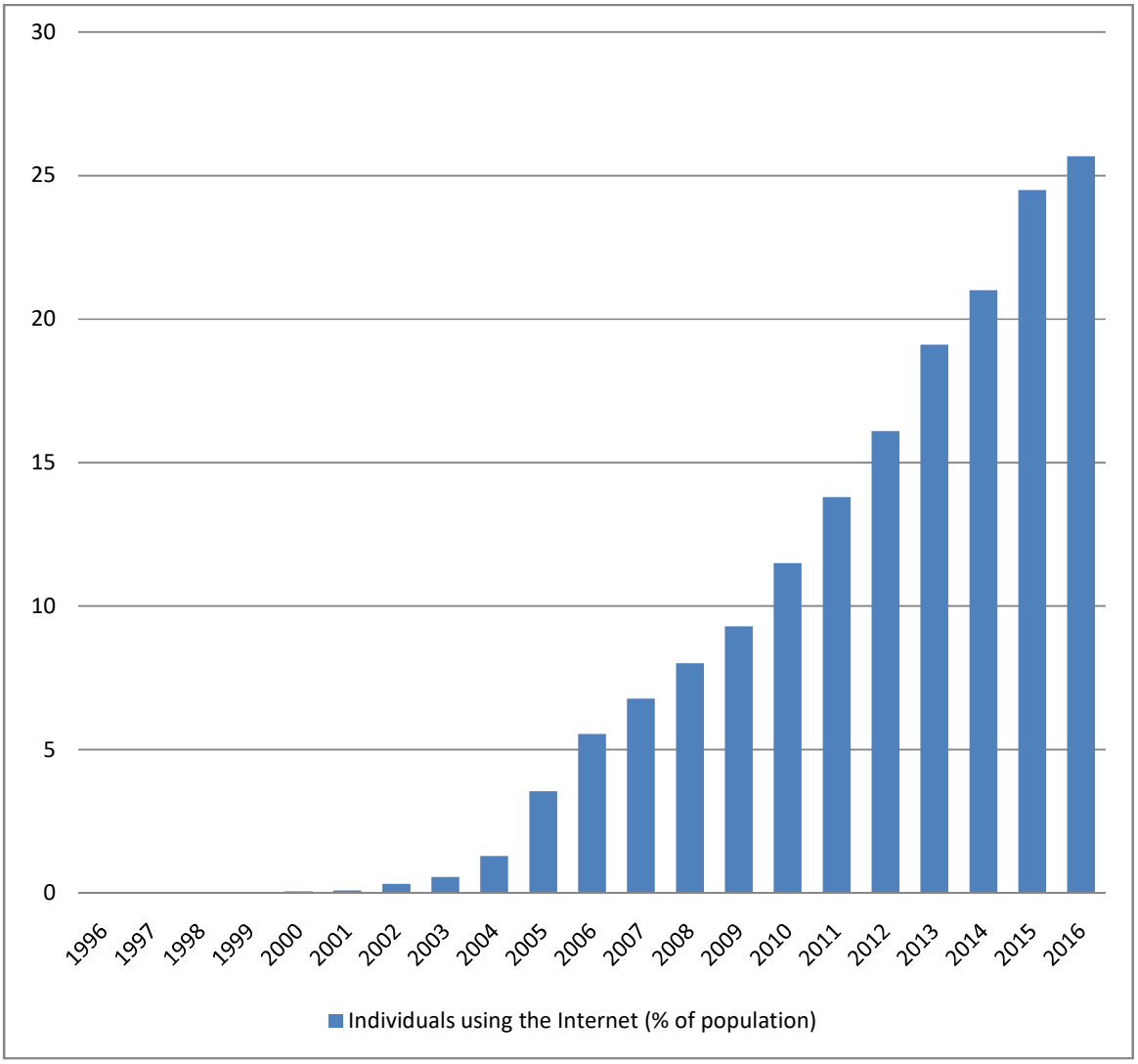


Figure 2.4: Trend of Internet Users (per 100 people) in Nigeria, 1996-2016
Source: World Development Indicators, 2018.

2.2.2.1.4 Ports

Over time, Nigeria's ports have undergone significant reforms. Nevertheless, congestion in Nigeria's seaports is still a serious concernas it leads to ships queuing up to berth at cargo terminals and containers waiting to be transported out of ports. This poses a great challenge to the economy—Nigeria being a major importer of commodities. Higher ports congestion certainly results to demurrage[12] on the part of importers. This may lead to higher cost of goods since importers may like to pass the burden unto the final consumers.

According to the 2015-2016 Global Competitiveness Report (GCR), Nigeria ranked 112nd out of 140 countries as regard its ports infrastructure quality. Figure 2.5 shows the trend of container ports traffic in Nigeria between 2003 and 2016. In 2004, for instance, container ports traffic amounted to 513,000 TEUs, a decreased by 14.62 percent from the 2003 (588,478TEUs). In 2005, container ports traffic stood at 663,000 TEUs, accounting for about 29.40 percent increase from the previous years.Between 2006 up to 2007,Nigeria recorded 513,000 and 431,950 TEUs, respectively. This was a continuous fall. Between the period of 2008 and 2014, ports in Nigeria experienced persistence increase of about 134.48 percent in the container ports traffic.

The increaseduring the said period may be attributed to the increase recorded in 2008 and 2009, when Nigeria Customs Services (NCS) introduced a circular known as *"Circular – 02".* The circular made it mandatory to seize and prosecute importers who made false declaration of their goods. This circular resulted in many consignees abandoning their cargos in the ports.Another instance that could have led to the increase in container traffic in 2008 and 2009 was decentralization of documentation processes and beaurucratic clearance procedures. Poor roads infrastructure leading to ports were also given as reasons. The latter results in around-the-clock traffic congestion.

[12]Demurrage is a penalty paid for spending beyond free time (usually 72 hours). This is maximum time a ship is allowed to take delivery, either from shipping or transporting company's warehouse. It is also called detention charge.

In 2016 however, the container traffic amounted to 1,437,000 TEUs, showing a decrease of 15.5 percent from the 2014 figure of 1,700,000 TEUs. The perennial challenges associated with Nigeria's portshave led to diversion of ships to ports in neighbouring countries. These diversions, by implication, reduces Nigeria's accessibility to global trade, and also Nigeria's low index in the liner shipping connectivity index as shownin Figure 2.6.

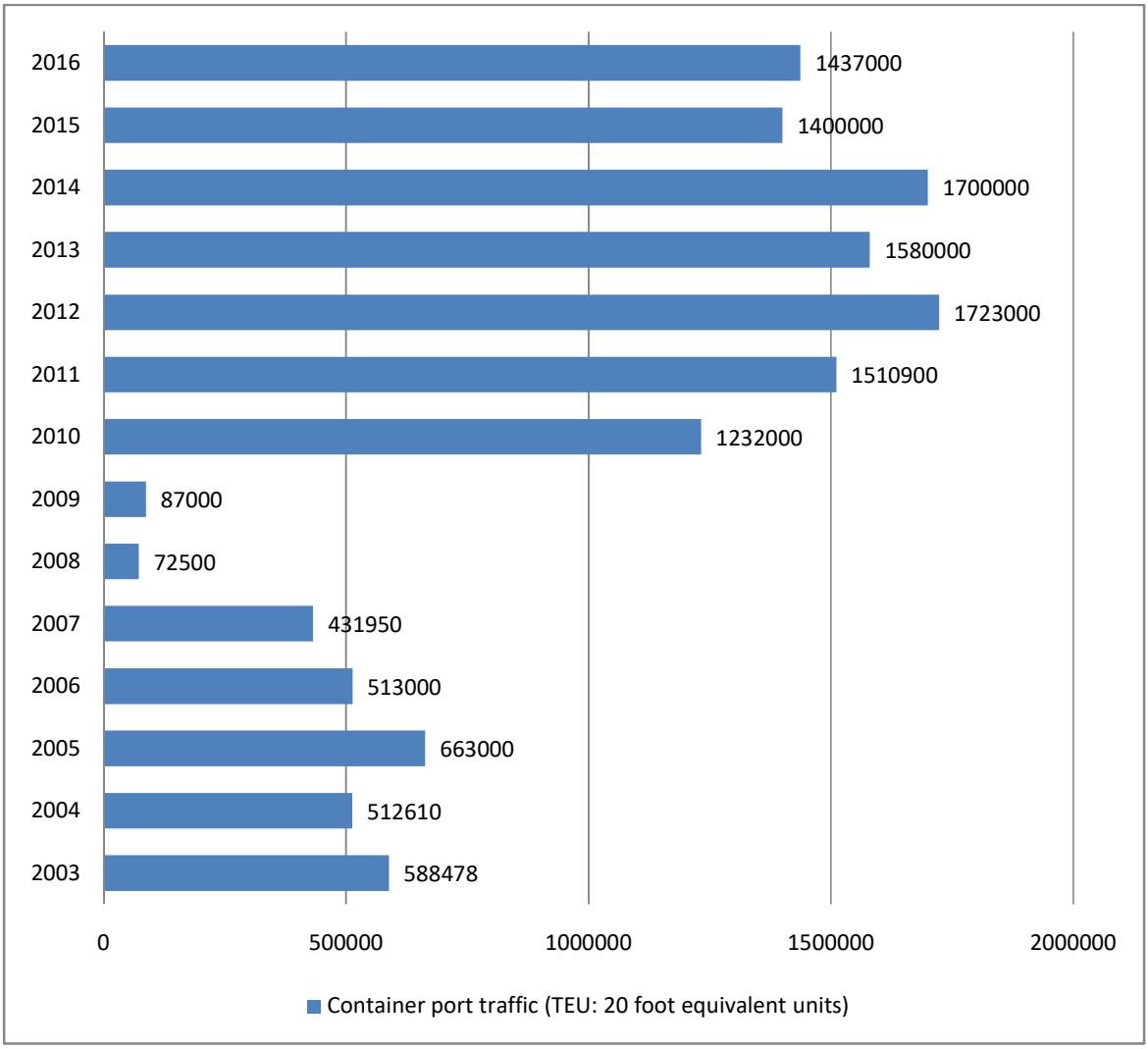


Figure 2.5: Container Ports Traffic (TEU: 20 foot equivalent units in Nigeria, 2003-2016

*Source:*Nigerian Ports Authority Report, 2015 and World Development Indicators, 2018.

2.2.2.1.5 Maritime Transport (Liner shipping connectivity index)

Maritime transport is measured by Liner Shipping Connectivity Index (LSCI). LSCI captures how well countries are connected to global shipping networks. It is also considered as alternative measure of openness to global trade. LSCIis computed based on five major components of connectivity: maximum vessel size, total container-carrying capacity of ships, number of ships, number of companies that deploy container ships on services from and to a country's ports and number of services.

A country with high connectivity index could easily access a high capacity and frequency global maritime transport system. This also makes effective participation of such country easier in global trade. The index is computed by dividing country's value of each component by its respective maximum value computed in 2004. The five components are averaged for each country, divided by the maximum average for 2004 and multiply by 100. LSCI generates a value of 100 for the country with the highest average index in 2004.

A look at Nigeria's LSCI and that of its major trading partners shows a low index for Nigeria in terms of maritime shipping connectivity and trade facilitation. Over the period of 2004-2009 and 2010-2016, Nigeria's LSCI values averaged 15.09 and 22.69. This is very low relative to its major trading partners, except Cote d'Ivoire, Ghana and Norway, as shown in Figure 2.6. LSCI values for Nigeria also ranged between 12.79 and 32.68 during the period 2004 and 2016, while the average value was 18.19. This is far below that of its major trading partners, except for Cote d'Ivoire, Ghana and Norway with average values 17.15, 16.59 and 6.21, respectively. This indicates that Nigeria has very low connectivity value relative to the average values of most of its major trading partners. This is expected to impede trading activities.[13]

[13] Belgium (74.99), Brazil (32.43), China (132.93), France (66.45), Germany (82.66), India (39.20), Italy (59.29), Japan (61.60), Netherlands (82.05), Singapore (94.87), South Africa (31.12), Spain (66.70), Sweden (35.71), Turkey (37.63), UAE (54.21), UK (79.06) and USt (81.73), respectively.

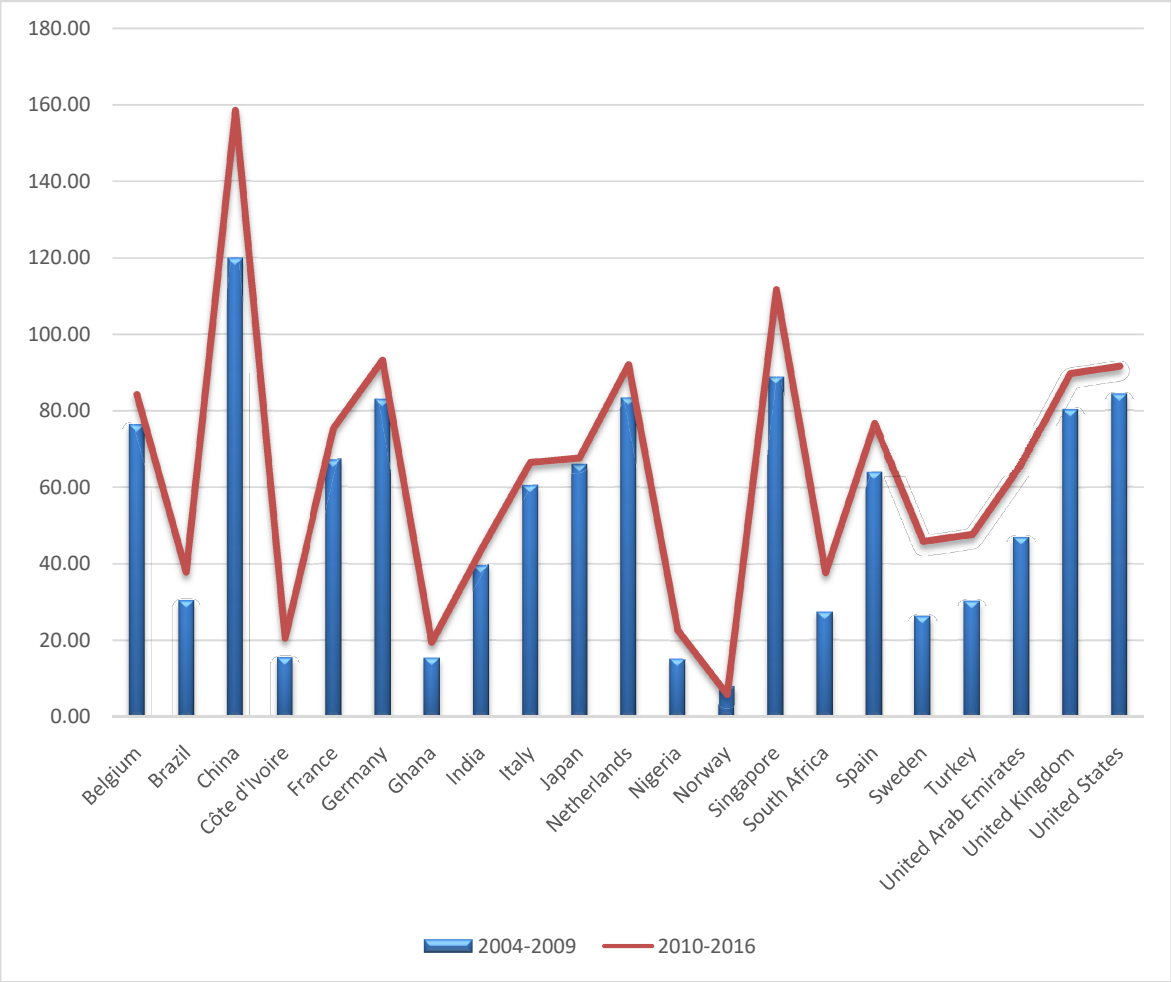


Figure 2.6: Trend of Liner Shipping Connectivity Index for Nigeria and its major Trading Partners, 2004-2009 and 2010-2016
*Source:*Author's Computation based on data extracted from UNCTADstatistics, 2017.

2.2.3 Border-related (or Domestic Regulatory) measures in Nigeria and Trading Partners

2.2.3.1 Logistics Performance Index (LPI)

The logistics supply chain measures countries' performance on six components which form the logistics performance index (LPI). Countries with conducive and favourable operational logistics environment for business are ranked higher on the LPI.LPI components include quality of trade and transport related infrastructure,efficiency of customs clearance process, quality of logistics services,ease of arranging priced shipments competitively, frequency with which shipments reach the consignee within scheduled time, and ability to track and trace consignments. These components were used to compute the overall score of LPI. The index of LPI ranges from 1 to 5 with higher scorerepresents better performance and vice-versa. With respect to these components, Table 2.2 compares the positions of Nigeria withits major trading partners in 2014 and 2016, respectively.

The latest available World Bank LPI (i.e., 2016) places Nigeria in a relatively fair position.Nigeria ranks90out of 160 countries, with overall score of 2.63 on a scale of 5. This position is low for Nigeria compared to the 2014 ranking. The 2016 ranking places Nigeria far behind its trading partners, except Cote d'Ivoire and Ghana that were placed at 95th and 100th positions, respectively. The overall score of the six LPI components is shown in Table 2.2.

As shown in Table 2.2, Nigeria scored 2.46 and ranked 92 out of 160 countries in 2016 up by 25 positions from 2014 ranking in the custom component of LPI.However, it still lagged behind most of its trading partners on the same component. On the state of infrastructure, Nigeria ranked 96th in the 2016 reportfar behind all its trading partners. Table 2.2 shows that infrastructural condition in most of these countries have improved in 2016 compared to 2014, though that of Germany, Italy and China still maintains the same positions (1st,19th and 23rd). Despite the deficiency in the quality of trade and transport related-infrastructure in Belgium, Cote d'Ivoire, Ghana, Norway and Turkey, these countries still occupied 14th, 89th, 86th, 17th and 31stpositions, and were ranked ahead of Nigeria in the 2016.

In the area of logistics services, Table 2.2 shows fair improvement for Nigeria in 2016 compared to 2014. Nigeria was placed 74th, up by 11 places from the 2014 ranking. This poor ranking is despite improvement in its logistics services.This ranking implies that Nigeira is still far behind most of its major trading partners even though Japan, Netherlands and the US dropped by 1 position while Belgium and the UK dropped by 2 positions. Cote d'Ivoire, France, Norway, Spain, and Turkey dropped from their previous positions in 2014 by 8, 4, 23, 11 and 14 places, respectively.

The ease of shipment component measures free flow of goods and indicates the ability of country towards organisingefficient shipments. This could be in terms of deliveries and competitive costs. On this component, Nigeria and some of itstrading partners dropped in the 2016 ranking unlike in 2014. Despite the poor performance of some of the trading partners as regards this component, Nigeria still ranked far behind them. On tracking and tracing of shipments component, Nigeria declined relative to its 2014 ranking. Nigeria was placed 82nd (dropped by 31 places) from the 2014 ranking. This put Nigeria far behind most of its trading partners, except Cote d'Ivoire and Ghana that were placed 89th and 101st positions, respectively in the 2016 report.

Finally, with respect to timeliness of shipments (i.e., expected delivery time of delivery), Nigeria'swas ranked 95th in 2016, relatively low compared to 2014. With this position, Nigeria was ranked only ahead of Cote d'Ivoire (113rd), but far behind most of other trading partners.

In summary, the overall average LPI score of Nigeria for the twoperiods (2014 and 2016) is 2.72. This score showed that Nigeria was a bit ahead of the world average score of 2.50,though the country still lagged behind its trading partners, except Cote d'Ivoire and Ghana with average score of 2.68 and 2.65, respectively.

Table 2.2: Logistics Performance Index Ranking for Nigeria and major Trading Partners for Two Editions

Countries	Years	Overall LPI Rank		Overall average score	Custom		Infrastructure		Ease of Shipment		Logistics Services		Ease of Tracking		Timeliness	
		Score (1-5)	Rank		Score (1-5)	Rank	Score (1-5)	Rank	Score (1-5)	Rank	Score (1-5)	Rank	Score (1-5)	Rank	Score (1-5)	Rank
Nigeria	**2014**	**2.81**	**75**	**2.72**	**2.35**	**117**	**2.56**	**83**	**2.63**	**107**	**2.70**	**85**	**3.16**	**51**	**3.46**	**57**
	2016	**2.63**	**90**		**2.46**	**92**	**2.40**	**96**	**2.43**	**118**	**2.74**	**74**	**2.70**	**82**	**3.04**	**95**
Belgium	2014	4.04	3	4.08	3.80	11	4.10	8	3.80	2	4.11	4	4.11	4	4.39	2
	2016	4.11	6		3.83	13	4.05	14	4.05	3	4.07	6	4.22	4	4.43	4
Brazil	2014	2.94	65	3.02	2.48	94	2.93	54	2.80	81	3.05	50	3.03	62	3.39	61
	2016	3.09	55		2.76	62	3.11	47	2.90	72	3.12	50	3.28	45	3.39	66
China	2014	3.53	28	3.60	3.21	38	3.67	23	3.50	22	3.46	35	3.50	29	3.87	36
	2016	3.66	27		3.32	31	3.75	23	3.70	12	3.62	27	3.68	28	3.90	31
Cote d'Ivoire	2014	2.76	79	2.68	2.33	120	2.41	101	2.87	75	2.62	95	2.97	67	3.31	64
	2016	2.60	95		2.67	70	2.46	89	2.54	105	2.62	87	2.62	89	2.71	128
France	2014	3.85	13	3.88	3.65	18	3.98	13	3.68	7	3.75	15	3.89	12	4.17	13
	2016	3.90	16		3.71	17	4.01	15	3.64	20	3.82	19	4.02	15	4.25	13
Germany	2014	4.12	1	4.18	4.10	2	4.32	1	3.74	4	4.12	3	4.17	1	4.36	4
	2016	4.23	1		4.12	2	4.44	1	3.86	8	4.28	1	4.27	3	4.45	2
Ghana	2014	2.63	100	2.65	2.22	130	2.67	70	2.73	93	2.37	121	2.90	73	2.86	113
	2016	2.66	88		2.46	93	2.48	86	2.71	85	2.54	98	2.52	101	3.21	82
India	2014	3.08	54	3.25	2.95	50	2.92	55	2.98	61	3.00	56	3.11	59	3.37	62
	2016	3.42	35		3.17	38	3.34	36	3.36	39	3.39	32	3.52	33	3.74	42
Italy	2014	3.69	20	3.70	3.36	29	3.78	19	3.54	17	3.62	23	3.84	14	4.05	22
	2016	3.76	21		3.45	27	3.79	19	3.65	17	3.77	21	3.86	20	4.03	22
Japan	2014	3.91	10	3.94	3.78	14	4.16	7	3.52	19	3.93	11	3.95	9	4.24	10
	2016	3.97	12		3.85	11	4.10	11	3.69	13	3.99	12	4.03	13	4.21	15

Table 2.2 (Continued): Logistics Performance Index Ranking for Nigeria and major Trading Partners for Two Editions

Countries	Years	Overall LPI Rank		Overall average score	Custom		Infrastructure		Ease of Shipment		Logistics Services		Ease of Tracking		Timeliness	
		Score (1-5)	Rank		Score (1-5)	Rank	Score (1-5)	Rank	Score (1-5)	Rank	Score (1-5)	Rank	Score (1-5)	Rank	Score (1-5)	Rank
Netherlands	2014	4.05	2	4.12	3.96	4	4.23	3	3.64	11	4.13	2	4.07	6	4.34	6
	2016	4.19	4		4.12	3	4.29	2	3.94	6	4.22	3	4.17	6	4.41	5
Norway	2014	3.96	7	3.85	4.21	1	4.19	4	3.42	30	4.19	1	3.50	31	4.36	5
	2016	3.73	22		3.57	20	3.95	17	3.62	25	3.70	24	3.82	22	3.77	39
Singapore	2014	4.00	5	4.07	4.01	3	4.28	2	3.70	6	3.97	8	3.90	11	4.25	9
	2016	4.14	5		4.18	1	4.20	6	3.96	5	4.09	5	4.05	10	4.40	6
South Africa	2014	3.43	34	3.61	3.11	42	3.20	38	3.45	25	3.62	24	3.30	41	3.88	33
	2016	3.78	20		3.60	18	3.78	21	3.62	23	3.75	22	3.92	17	4.02	24
Spain	2014	3.72	18	3.73	3.63	19	3.77	20	3.51	21	3.83	12	3.54	26	4.07	17
	2016	3.73	23		3.48	24	3.72	25	3.63	22	3.73	23	3.82	23	4.00	26
Sweden	2014	3.96	6	4.08	3.75	15	4.09	9	3.76	3	3.98	6	3.98	7	4.26	8
	2016	4.20	3		3.92	8	4.27	3	4.00	4	4.25	2	4.38	1	4.45	3
Turkey	2014	3.50	30	3.46	3.23	34	3.53	27	3.18	48	3.64	22	3.77	19	3.68	41
	2016	3.42	34		3.18	36	3.49	31	3.41	35	3.31	36	3.39	43	3.75	40
United Arab Emirates	2014	3.54	27	3.74	3.42	25	3.70	21	3.20	43	3.50	31	3.57	24	3.92	32
	2016	3.94	13		3.84	12	4.07	13	3.89	7	3.82	18	3.91	18	4.13	18
United Kingdom	2014	4.01	4	4.04	3.94	5	4.16	6	3.63	12	4.03	5	4.08	5	4.33	7
	2016	4.07	8		3.98	5	4.21	5	3.77	11	4.05	7	4.13	7	4.33	8
United States	2014	3.92	9	3.96	3.73	16	4.18	5	3.45	26	3.97	7	4.14	2	4.14	14
	2016	3.99	10		3.75	16	4.15	8	3.65	19	4.01	8	4.20	5	4.25	11
Number of countries ranked			**160 countries in 2016 ranking and 160 countries in 2014 ranking**													
Source: **Compiled from World Bank's Logistics Performance Index, Data Base.**																

2.2.3.2 Trading across Borders Index (TBI)

Doing business in Nigeria could be challenging due to high costs of trading in and out of its borders. Before TFA, trading in the country requires 9.1 documents on average when exporting and 13.4 documents on average when importing (World Bank, 2015). This was considerably higher compared with the requirements of trading partners. As for time, an average of 26.4 days was required to ship goods from Nigeria to the rest of the worldwhereas an average of 42.1 days was required to ship goods from a partner country to Nigeria (See Table 2.3). In most of Nigeria's trading partners, except Ghana, it takes even fewer days to export and import.

In respect to costs of trading, Table 2.3 shows Nigeria to be unfavourable. For instance, costs of exporting and importing a container in and out of Nigeria remained significantly higher than its trading partners.Average cost to export and import a container in Nigeria before TFA period was US$1,195.78 and US$1,408.83, respectively. This wasconsiderably higher compared with its trading partners, except Brazil, Cote d'Ivoire and South Africa which recorded an average of US$1,378.81, US$1,659.67 and US$1,402.67 on export andUS$1,567.70, US$2,201.00 and US$1,626.11, respectivelyon import.

With the commencement of TFA in December 2013, time, document and cost were integrated into two (i.e., time to export/import, documentary compliance (hours) and cost to export/import, documentary compliance (US$)). This was in addition to implementation of paperless trade systems, stated in Article 10.4 of the WTO Trade Facilitation Agreement. These overhaul allowed for the exchange of trade-related data and documents electronically, making documentation more efficient and effective (Bourquin & Heal, 2016). These improvements were further strengthened by the introduction of ASYCUDA++ (the newly version of Automated System for Customs Data Entry). The automated system is used to facilitate quick clearance of goods at the ports. With the implementation of TFA, the requirements for cross-border trade have been simplified. However, ease of doing business in Nigeria still remains higher compared to its trading partners, except Ghana.

For instance, Nigeria requires anaverage of 131 hours and 173 hours, equivalent to 5.46 days and 7.21 days to export and import. In respect of cost to move a 20-foot

container, it requires US$250.00 and US$564.00 to export and import, respectively (World Bank, 2018). As can infer from the Table, what necessitates high cost of trading in Nigeria is failure of the country to streamline documentation and bureaucratic clearance procedures.

Table 2.3: Cross-Border Trade Indicators for Nigeria and major Trading Partners,2005-2013 and 2014-2016

	EXPORTS					IMPORTS				
	PRE-TFA period (2005-2013)			During TFA period (2014-2016)[14]		PRE-TFA period (2005-2013)			During TFA period (2014-2016)	
Countries	Number of Document required	Days spent	Cost (US $ per container)	Time: documentary compliance (hours)	Cost US $ per container): documentary compliance	Number of Document required	Days spent	Cost (US $ per container)	Time: documentary compliance (hours)	Cost US $ per container): documentary compliance
Nigeria	9.1	26.4	1195.78	131	250.00	13.4	42.1	1408.83	173	564.00
Belgium	4	9	1233.67	1	0	4	8.7	1400.00	1	0
Brazil	6	14.7	1378.81	22	226.00	8	19.2	1567.70	137.33	107.00
China	8	21.2	503.67	21	85.00	5.4	24.2	542.78	66	171.00
Cote d'Ivoire	9	24.1	1659.67	120	136.00	13	38.7	2201.00	113	267.00
France	3	11.4	1285.00	1	0	3.9	12.2	1378.33	1	0
Germany	4	8.3	852.78	1	45.00	4	7	874.44	1	0
Ghana	6	22.3	765.00	89	155.00	7	42.4	1122.78	301.33	474.00
India	7	19.1	960.00	40	99.00	10	24.9	1181.67	62.33	142.00
Italy	3	19.9	1260.33	1	0	3	18	1210.33	1	0
Japan	3	11	884.92	2	60.00	5	11	1090.26	3	100.00
Netherlands	4	7	920.00	1	0	4.8	6	982.67	1	0
Norway	4	8	963.78	2	0	5	7	820.00	2	0
Singapore	3	6	443.11	2	37.00	3	4	415.11	3	40.00
South Africa	6.6	23	1402.67	68	170.00	6.8	31.8	1626.11	36	213.00
Spain	4	10	1194.89	1	0	4.6	9.8	1265.22	1	0
Sweden	3	9	673.44	1	40.00	3	6	696.33	1	0
Turkey	7.2	14.8	909.00	5	87.00	9.1	16.7	1067.22	11	142.00
United Arab Emir	3.4	8	559.22	6	178.00	5.9	8.1	548.22	12	283.00
United Kingdom	4	9.1	1015.00	4	25.00	4	7.1	1166.22	2	0
United States	3	6	1030.44	2	60.00	5	5	1251.22	8	100.00

Source: Author's Computation based on World Development Indicators database, 2015 and 2018.

Note: The period average is calculated for each dates

[14]The requirements for exports and imports during TFA had been integrated into two: Time to export/import: Documentary compliance (hours) and Cost to export/import: Documentary compliance (USD).

2.2.3.3 Nigeria's Case and Position among major Trading Partners in the Ease of Doing Business Rankings

Nigeria's low ranking in ease of doing business is mainly ascribed to excessive requirementsandunfriendly regulatory environment of its trading environment.Consequently, the World Bank Doing Business report overtime has been ranking Nigeria very low compared with its major trading partners. The documents, time (days) and cost required to complete the four predefined stages (customs clearance and inspections, document preparation,port and terminal handling, and inland transport and handling) for exporting and importing in Nigerian ports remain extremely high.These requirements constitute the challenges that make conducting efficient business operations impossible in Nigeria and consequently necessitated high transaction costs in the country. These have always been considered for doing business ranking by the World Bank.In 2005 for instance, required number of documents to export in Nigeriaonly reduced marginally from 10 to 9 in 2006 and this was maintained till 2013 (See Figure 2.7). Similarly, number of documents to import stood at 13 since 2006 till 2013 without significant effort towards reducing this requirement.

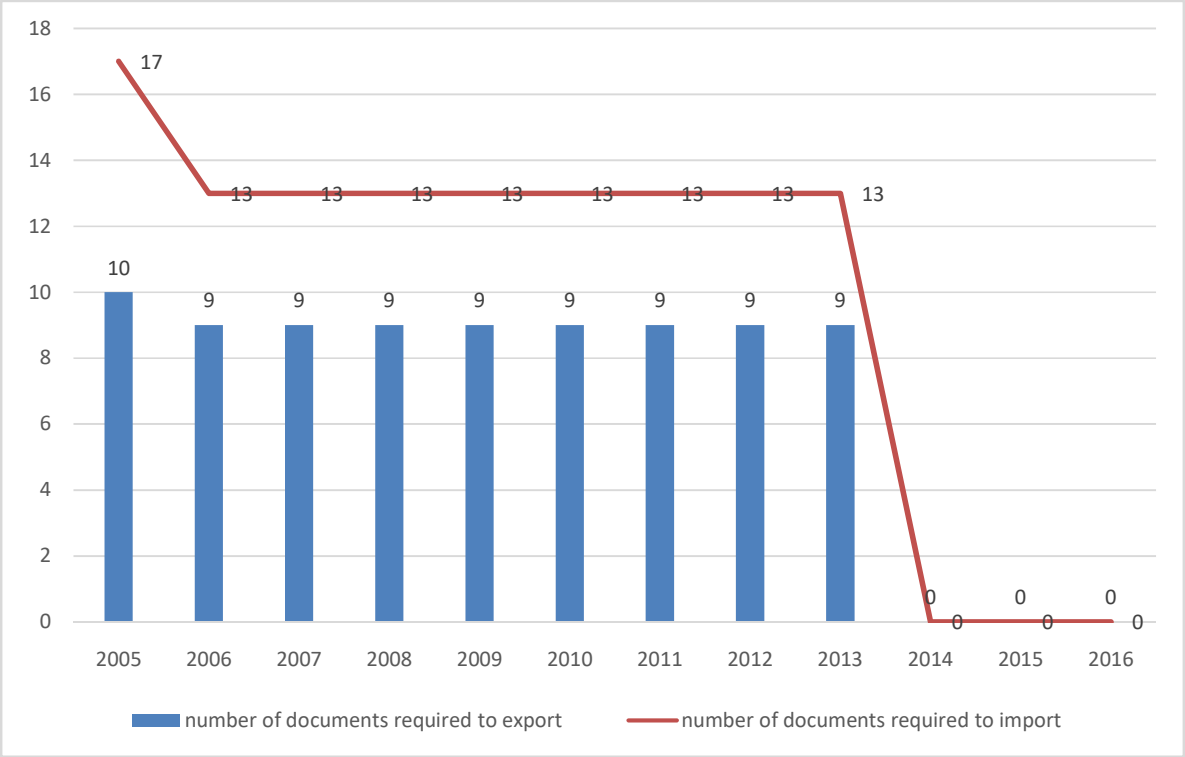


Figure 2.7: Number of Documents Required to Doing Business across Border in Nigeria, 2005-2016

Source: Extracted from World Development Indicators, 2015 and 2018.

In the case of time, measured by required number of days to export and import in Nigeria, it significantly reduced from 41 days and 53 days in 2005 to 24 days and 39 days in 2012. It further reduced marginally to 22.9 days and 33.9 days in 2013 (See Figure 2.8). In addition, cost required in Nigeria to export a container significantly increased from US$ 798 in 2005 to US$ 1,380 in 2012 and further to US$ 1,564 in 2013. On the other hand, cost to import a container marginally reduced from US$ 1,460 in 2005 to US$ 1,440 in 2011 but increased in 2012 to US$ 1540 and to US$ 1,959.5 in 2013 as shown in Figure 2.9. The implication of these scenarios is that Nigeria's business environment is uncompetitive. Since 2014 however, zero number of document is required while cost and time to export and import significantly reduced compared to the period before the TFA. All these marked the benefits of TFA.

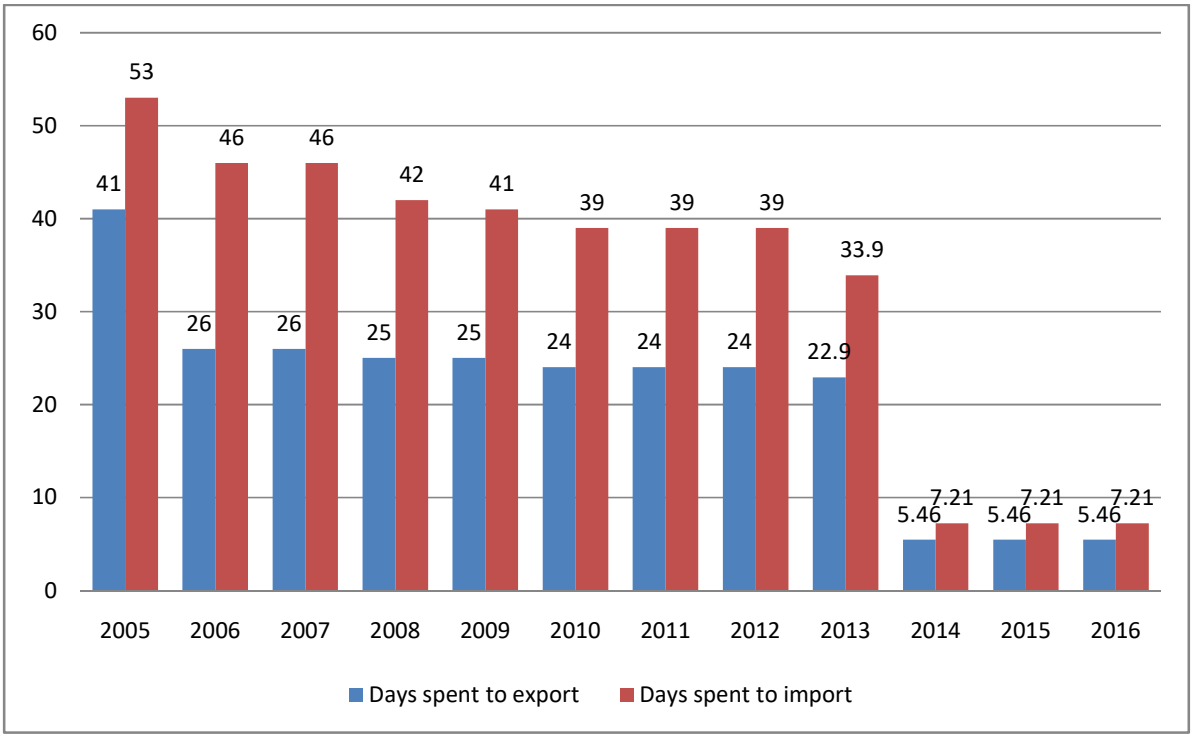


Figure 2.8: Days Spent to Doing Business across Border in Nigeria, 2005-2016
Source: Extracted from World Development Indicators, 2015 and 2018.

In 2006 for instance, it was ranked 94th out of 155 countries, far behind others except Brazil, Cote d'Ivoire and India. Nigeria's position is continuously getting worse, ranked 108th, 118th and 137th in 2007, 2009 and 2011, respectively. In 2012, Nigeria ranked 133rd out of 183 countries, slightly higher than her position in 2011. This was far below Singapore, US, Norway, UK, Sweden, Japan, Germany, Belgium, France, Netherlands, UAE, South Africa, Spain, Ghana, Turkey, Italy and China that occupied 1st, 4th, 6th, 7th, 14th, 19th, 20th, 28th, 29th, 31st, 33rd, 35th, 44th, 63rd, 71st, 87th and 91st positions, respectively but just behind Brazil and India that occupied 126th and 132nd positions. In the 2014 Doing Business report, Nigeria's situation became worsened as it ranked 147th out of 189 countries surveyed.This was still far behind her major trading partners except Cote d'Ivoire. In the 2016 edition, Nigeria was surprisingly ranked 169 out of 189 countries surveyed. This implies that Nigeria has several inhibitions to trade. Table 2.4 also reveals that some of these major trading partners with Nigeria on the average were ranked higher in 2016 compared with their positions in the previous years except Belgium, Ghana, Japan, South Africa, UAE and US. For instance, UK, Sweden, Germany, France, Spain, Italy, Turkey, China, India, Cote d'Ivoire and West Africa average occupied 10th, 14th, 21st, 38th, 52nd, 65th, 69th, 96th, 134th, 167th and 155th positions in 2014 while in 2016 placed at 6th, 8th, 15th, 27th, 33rd, 45th, 55th, 84th, 130th, 142th and 153rd positions, respectively. During these periods, Singapore still maintained 1st position among all. However, due to over regulation or stringent conditions and unfavourable business environment, Belgium, Ghana, Japan, South Africa, UAE and US were ranked lower in 2016 relative to their positions in 2014. In spite of this, Nigeria still lags behind them all. This therefore shows that Nigeria has a less conducive and less enabling environment to operate business. The analysis also shows that Nigeria has overtime been one of the 20 least performer countries in the World. The constraints in Nigeria's business environment remain a discouraging factor to most firms to actively participate in international trade and these retard the trade performance of Nigerian economy in the international trade arena.

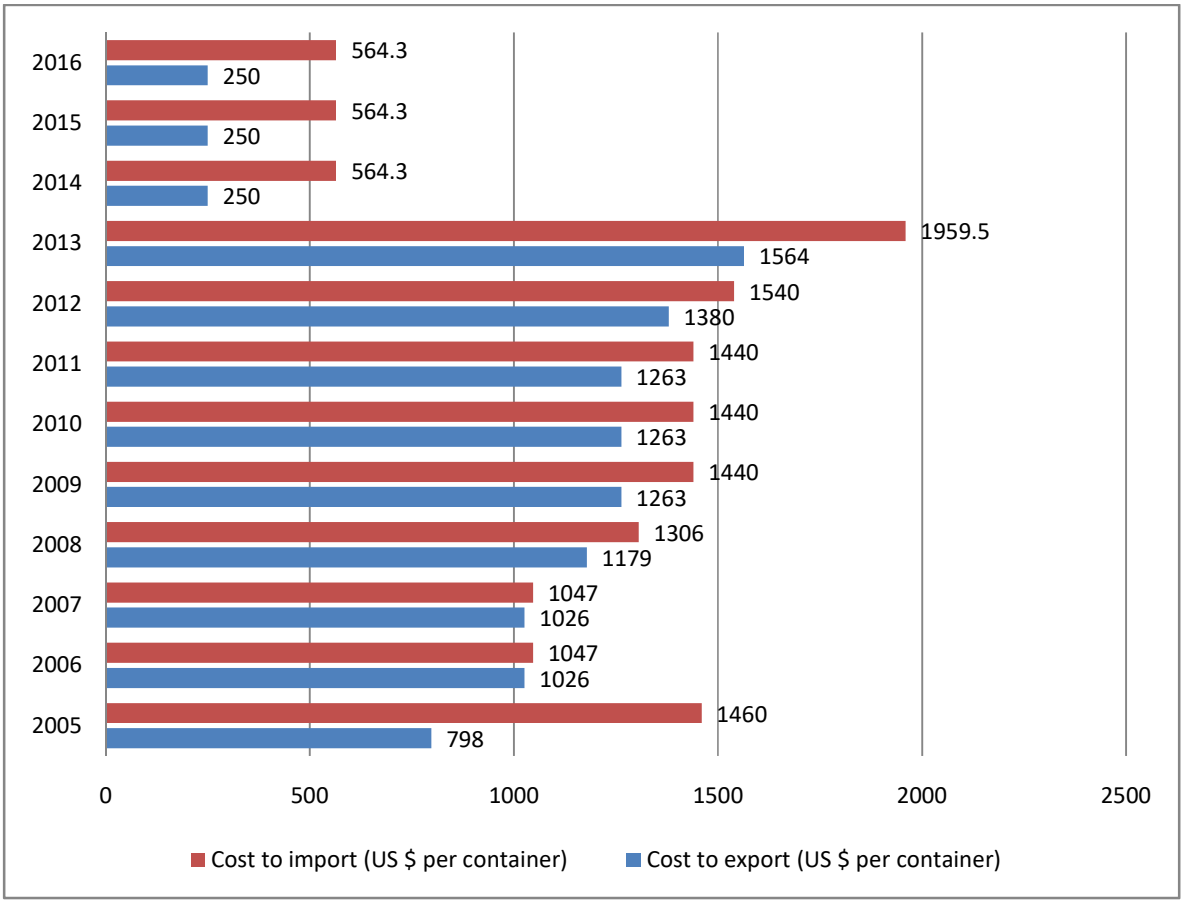


Figure 2.9: Cost (US$ per container) to Doing Business across Border in Nigeria, 2005-2016

Source: Extracted from World Development Indicators, 2015 and 2018.

Table 2.4: Ease of Doing Business rankings from 2006 to 2016

Countries	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nigeria	94	108	108	118	125	137	133	131	147	170	169
Belgium	18	20	19	19	22	25	28	33	36	42	43
Brazil	119	121	122	125	129	127	126	130	116	120	116
China	91	93	83	83	89	79	91	91	96	90	84
Cote d'Ivoire	145	141	155	161	168	169	167	177	167	147	142
France	44	35	31	31	31	26	29	34	38	31	27
Germany	19	21	20	25	25	22	19	20	21	14	15
Ghana	82	94	87	87	92	67	63	64	67	70	114
India	116	134	120	122	133	134	132	132	134	142	130
Italy	70	82	53	65	78	80	87	73	65	56	45
Japan	10	11	12	12	15	18	20	24	27	29	34
Netherlands	24	22	21	26	30	30	31	31	28	27	28
Norway	5	9	11	10	10	8	6	6	9	6	9
Singapore	2	1	1	1	1	1	1	1	1	1	1
South Africa	28	29	35	32	34	34	35	39	41	43	73
Spain	30	39	38	49	62	49	44	44	52	33	33
Sweden	14	13	14	17	18	14	14	13	14	11	8
Turkey	93	91	57	59	73	65	71	71	69	55	55
United Arab Emirates	69	77	68	46	33	40	33	26	23	22	31
United Kingdom	9	6	6	6	5	4	7	7	10	8	6
United States	3	3	3	3	4	5	4	4	4	7	7
West Africa average	132	144	151	153	155	153	151	152	155	152	153
Number of countries ranked	155	175	181	182	182	183	183	184	189	189	189

Source: Compiled from World Bank Doing Business Report's Trading across Borders Indicators.

2.2.4 Institutional QualityMeasures of Nigeria and its Trading Partners

Quality of institutions is measured by control of corruption, regulatory quality, rule of law, government effectiveness, political stability and absence of violence/terrorism,voice and accountability (Kaufmann, Kraay& Mastruzzi, 2011). Figure 2.10 presents the quality of Nigeria and major trading partners' institutions from 1996 to 2005 and 2006 to 2016. The estimates of each of these indicators give the country's score on aggregate indicator at approximately -2.5 (weak) to 2.5 (strong) institutions. The average value of these indices revealed that Nigeria's institutions were weak. The country's institutions were ranked 124 out of 140 countries surveyed in 2015-2016by Global Competitiveness Index (GCI). This position is far behind those of its major trading partners (World Economic Forum, 2016).[15]

Figure 2.10 shows that most of Nigeria's major trading partners particularly from developed countries are in positive range on corruption while those from developing countries(Brazil, China, Cote d'Ivoire, Ghana and India) are in negative range though ahead of Nigeria.For instance, businessmen find it cheaper and easier to bribe their way by wrongly declaring goods at customs so avoid paying stipulated fees (Buyonge & Kireeva, 2008; Caesar, 2010). The low score for Nigeria shows that there are weak mechanisms for controlling corrupt practices.The 2017 corruption perception index (CPI) by Transparency International, which ranked Nigeria 148th out of 180 countries, seem to justify the country's institutional challenge.

The negative estimates on rule of law show that adherence to the principle in Nigeria is very low compared to what obtains among its major trading partners. Most of the trading partners are in the positive range. However, only Brazil, China, Cote d'Ivoire, Ghana and India have similar characteristics as Nigeria. And where it prevails, there is lack of fairness in its application or non-compliance with the law in Nigeria. Also, police services and the judiciary can no more be trusted to enforce law and order as there are no abiding rules and a better functioning justice system prevailing in the country. Due to these, a lot of criminal

[15]Singapore (2nd), Norway (5th), United Arab Emirates (9th), Netherlands (10th), Japan (13th), United Kingdom (14th), Sweden (11th), Germany (20th), Belgium (22nd), United States (28th), France (29th), South Africa (38th), China (51st), India (60th), Cote d'Ivoire (62nd), Spain (65th), Ghana (72nd), Turkey (75th), Italy (106th)and Brazil (94th) positions, respectively.

activities which include: petty crime, violent crime, politically and ethnically motivated crime, kidnapping, robbery, sexual and domestic violence, and organized criminal activities like cybercrime through the use of information and communication technology (ICT) have continued to flourish in Nigeria.

Regulatory quality includes ease of starting a business governed by local law, ease of setting up a subsidiary for a foreign firm, ease of starting a new business, placing less burden of government regulations on investors to encourage not only the local firms to actively participate in international trade but also to motivate the foreign investors to invest in Nigeria. The estimate with negative figures over the years implying that regulatory quality in Nigeria is very low relative to most of its trading partners in the positive range except China, Cote d'Ivoire and India.

The negative estimates on political stability and absence of violence/terrorism reveal that incidences of violence, terrorism and other related issues have been high in Nigeria relative to major trading partners, except Brazil, China, Cote d'Ivoire, Ghana, India, South Africa, Spain and Turkey. For almost a decade, Nigeria has been under tension with cases of violence and terrorism (militancy in the Niger Delta and Boko Haram insurgency in the North). The activities of these groups do not only pose threat to the economy but also make the country unconducive for businesses.

For government effectiveness, the negative estimates indicate that perception concerning the quality of public services, civil service and the degree of its independence from political pressures is very low. This contrasts sharply with the perception index of some of Nigeria's major trading partners. The exceptions here were Brazil, Cote d'Ivoire, Ghana and India.

Voice and accountability proxied by democratic accountability is the degree to which citizens of a country enjoy full participation in government, freedom of expression, association and free media. Nigeria's democratic accountability score is very poor compared to most of its trading partners, except China, Cote d'Ivoire, Singapore, Turkey and UAE.

Generally, the negative figure revealed by the six indicators of institutional quality for Nigeria among its major trading partners is a reflection of very weak institutional setup. All these make business operations in Nigeria more costly.

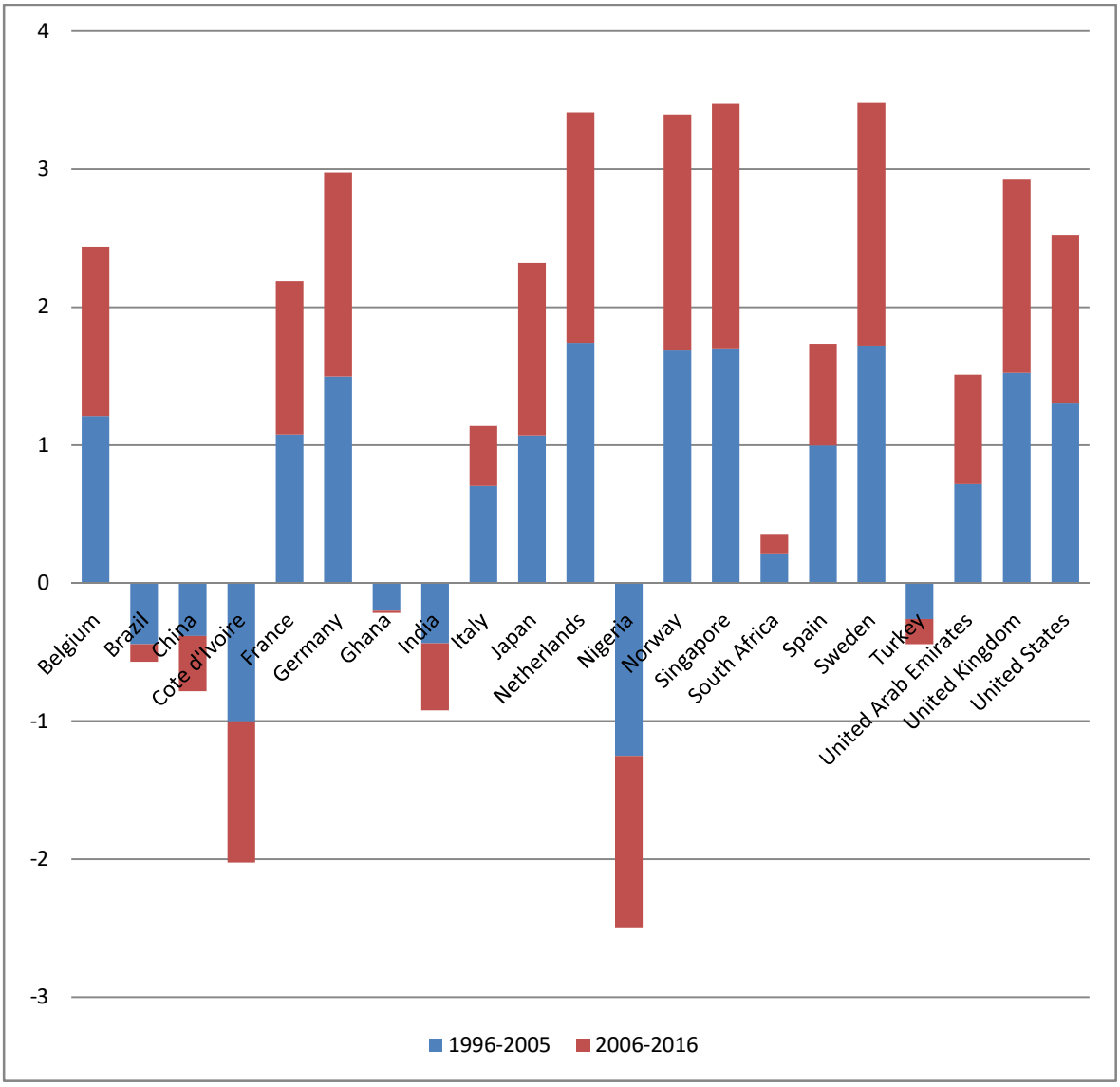


Figure 2.10: Average Score of Institutional Quality Indicators for Nigeria and Trading Partners, 1996-2005 and 2006-2016

Source: Computed from the World Bank, Worldwide Governance Indicators (WGI), 2017 data.

2.3 Analysis of Nigeria's Trade Flowswith Trading Partners

2.3.1 Nigeria's Merchandize Exports and Imports

Table 2.5shows that between 2005 and 2012, merchandise exports of Nigeria to United States exceeded those of other major trading partners. Merchandise exports to United States alone worth US$10.42 billion in 2005 and US$24.14 billion in 2012. This accounted for about 40.13 percent and 20.76 percent of the total merchandise exports to major trading partners. These values were more than the average merchandise exports to the twenty major trading partners between 2005 and 2013.

Conversely, Nigeria's export to India surpassed those of other major trading partners, particularly from 2013 to 2016. During these periods, merchandise exports to India alone accounted for at least 15percent,18 percent, 22 percent and 25 percent of the total merchandise exports to the major trading partners. Nigeria's exports to India significantly declined from US$11.45 billion in 2013 to US$7.41 billion in 2016. These exports values were also more than the average exports to the twenty major trading partners with Nigeria for each period.

Table 2.6reveals that Nigeria's merchandise imports are predominantly from China and US, recording US$2.30 billion and US$9.71 billion, respectively. This constituted about 15.81 percent and 39.31 percent of the total merchandise imports from the major trading partners. Imports value for each year was more than the average imports from the twenty major trading partners. From 2007 to 2009, imports from China were the highest, accounting for about 19.22 percent, 23.30 percent and 29.48 percent, respectively. For the periods 2010 and 2011, imports from United States outweighed those from other trading partners accounting for about 24.42 percent and 23.74 percent of the total merchandise imports from the major trading partners. From 2012 to 2016, imports from China had been dominating and again more than the average imports from the twenty major trading partners. Merchandise imports from China alone for each of these periods valued at US$7.72 billion, US$9.68 billion, US$10.20 billion, US$13.70 billion and US$9.71 billion(accounting for about 26.49 percent, 29.96 percent,28.23 percent, 42.40 percent and 39.31 percent of the total merchandise imports from the major trading partners).

Table 2.5: Nigeria's Merchandize Exports to Major Trading Partners (Trade value in Million US$)

Country/year		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Belgium	Value	93.35	7.54	4510.56	843.14	298.39	2112.66	299.26	1049.74	144.55	74.41	116.11	101.69
	Share in total (%)	(0.36)	(0.01)	(9.54)	(1.19)	(0.80)	(3.09)	(0.32)	(0.90)	(0.19)	(0.09)	(0.25)	(0.35)
Brazil	Value	2643.02	2503.87	3459.54	5308.03	3986.58	6041.97	10558.27	10791.46	8576.20	8315.64	4633.12	1305.14
	Share in total (%)	(10.18)	(4.84)	(7.31)	(7.47)	(10.71)	(8.84)	(11.18)	(9.28)	(11.46)	(10.08)	(10.07)	(4.44)
China	Value	526.88	4.13	873.33	268.09	716.92	1440.81	2527.02	8038.72	1110.44	1669.69	1240.70	907.01
	Share in total (%)	(2.03)	(0.01)	(1.85)	(0.38)	(1.93)	(2.11)	(2.68)	(6.91)	(1.48)	(2.02)	(2.70)	(3.09)
Cote d'Ivoire	Value	1438.84	2141.78	1185.85	1832.64	1504.53	1270.76	1795.77	2618.90	2353.28	2330.94	1444.16	842.97
	Share in total (%)	(5.54)	(4.14)	(2.51)	(2.58)	(4.04)	(1.86)	(1.90)	(2.25)	(3.14)	(2.83)	(3.14)	(2.87)
France	Value	1467.49	3351.16	1971.52	3370.60	2713.75	3505.96	7370.55	5958.71	5313.47	5897.74	3266.29	2365.68
	Share in total (%)	(5.65)	(6.48)	(4.17)	(4.74)	(7.29)	(5.13)	(7.80)	(5.12)	(7.10)	(7.15)	(7.10)	(8.05)
Germany	Value	882.41	3.55	1253.94	1265.56	454.71	560.79	1275.31	2144.15	2069.45	1738.17	2185.21	1508.41
	Share in total (%)	(3.40)	(0.01)	(2.65)	(1.78)	(1.22)	(0.82)	(1.35)	(1.84)	(2.76)	(2.11)	(4.75)	(5.13)
Ghana	Value	570.69	1563.13	859.43	1861.74	303.53	442.43	889.41	1310.01	1392.34	962.81	0.00	48.88
	Share in total (%)	(2.20)	(3.02)	(1.82)	(2.62)	(0.82)	(0.65)	(0.94)	(1.13)	(1.86)	(1.17)	(0.00)	(0.17)
India	Value	62.36	5507.52	4398.85	7871.54	4768.61	9068.48	12790.04	15895.24	11453.44	14980.99	10233.80	7407.50
	Share in total (%)	(0.24)	(10.65)	(9.30)	(11.08)	(12.81)	(13.26)	(13.54)	(13.67)	(15.30)	(18.16)	(22.25)	(25.20)
Italy	Value	753.98	1468.36	584.25	2687.78	2080.19	3047.86	6404.82	8796.79	6317.96	4503.82	878.56	668.43
	Share in total (%)	(2.90)	(2.84)	(1.24)	(3.78)	(5.59)	(4.46)	(6.78)	(7.56)	(8.44)	(5.46)	(1.91)	(2.27)
Japan	Value	973.75	1113.16	359.04	294.83	231.63	392.45	386.80	699.56	451.86	3258.50	2818.09	878.69
	Share in total (%)	(3.75)	(2.15)	(0.76)	(0.41)	(0.62)	(0.57)	(0.41)	(0.60)	(0.60)	(3.95)	(6.13)	(2.99)
Netherlands	Value	950.61	1528.38	174.65	3295.12	1339.53	3936.55	2675.03	9957.57	9520.38	10492.63	3724.83	1370.95
	Share in total (%)	(3.66)	(2.96)	(0.37)	(4.64)	(3.60)	(5.76)	(2.83)	(8.56)	(12.72)	(12.72)	(8.10)	(4.66)
Norway	Value	0.181	14.37	4.05	15.64	4.09	34.75	245.94	240.34	375.25	145.85	26.45	19.50
	Share in total (%)	(0.001)	(0.03)	(0.01)	(0.02)	(0.01)	(0.05)	(0.26)	(0.21)	(0.50)	(0.18)	(0.06)	(0.07)
Singapore	Value	2.48	7.23	46.02	84.91	33.23	215.81	319.67	1490.53	665.48	419.60	15.34	10.31
	Share in total (%)	(0.01)	(0.01)	(0.10)	(0.12)	(0.09)	(0.32)	(0.34)	(1.28)	(0.89)	(0.51)	(0.03)	(0.04)

SouthAfrica	Value	653.86	1064.80	1382.29	2617.61	1679.17	1858.17	2669.06	4730.80	4376.22	5101.25	4579.05	2069.89
	Share in total (%)	(2.52)	(2.06)	(2.92)	(3.68)	(4.51)	(2.72)	(2.83)	(4.07)	(5.85)	(6.18)	(9.96)	(7.04)
Spain	Value	3919.35	4725.80	717.92	2798.63	2178.26	2830.08	7412.70	7801.98	6325.53	9578.49	5124.58	3528.30
	Share in total (%)	(15.10)	(9.14)	(1.52)	(3.94)	(5.85)	(4.14)	(7.85)	(6.71)	(8.45)	(11.61)	(11.14)	(12.00)
Sweden	Value	59.64	0.008	0.043	418.64	31.35	55.90	2.95	963.13	1266.24	1487.39	790.13	662.56
	Share in total (%)	(0.23)	(0.00001)	(0.0001)	(0.59)	(0.08)	(0.08)	(0.003)	(0.83)	(1.69)	(1.80)	(1.72)	(2.25)
Turkey	Value	234.27	1.622	35.74	52.00	194.69	475.41	447.74	526.12	675.36	2237.14	189.99	157.81
	Share in total (%)	(0.90)	(0.003)	(0.08)	(0.07)	(0.52)	(0.70)	(0.47)	(0.45)	(0.90)	(2.71)	(0.41)	(0.54)
United Arab Emirates	Value	32.69	1.10	39.71	76.55	48.87	53.70	231.00	92.52	155.08	126.01	547.43	19.77
	Share in total (%)	(0.13)	(0.002)	(0.08)	(0.11)	(0.13)	(0.08)	(0.24)	(0.08)	(0.21)	(0.15)	(1.19)	(0.07)
United Kingdom	Value	276.06	31.94	283.29	1341.73	1052.16	1267.36	7809.06	9042.01	4653.35	5205.24	2173.27	1150.37
	Share in total (%)	(1.06)	(0.06)	(0.60)	(1.89)	(2.83)	(1.85)	(8.27)	(7.78)	(6.22)	(6.31)	(4.73)	(3.91)
United States	Value	10418.33	26656.48	25157.31	34758.31	13618.24	29755.94	28327.51	24139.34	7669.90	3954.74	2003.77	4376.58
	Share in total (%)	(40.13)	(51.56)	(53.19)	(48.91)	(36.57)	(43.52)	(30.00)	(20.76)	(10.24)	(4.79)	(4.36)	(14.89)
Average		1298.01	2584.80	2364.87	3553.15	1861.92	3418.39	4721.90	5814.38	3743.29	4124.05	2299.54	1470.02
Maximum		10418.33	26656.48	25157.31	34758.31	13618.24	29755.94	28327.51	24139.34	11453.44	14980.99	10233.80	7407.50
Highest Maximum Share (%)		(40.13)	(51.56)	(53.19)	(48.91)	(36.57)	(43.52)	(30.00)	(20.76)	(15.30)	(18.16)	(22.25)	(25.20)

Source: Author's calculation based on World Integrated Trade Solution (WITS) database, 2017.

Notes: SITC Revision 2 is reported as it contained data of more years.

Table 2.6: Nigeria's Merchandize Imports from major Trading Partners (Trade value in Million US$)

Country/year		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Belgium	Value	273.07	1170.96	3960.79	1593.52	1627.64	1706.41	2008.95	1312.16	2169.76	3369.66	1967.65	2095.63
	Share in total (%)	(1.87)	(6.41)	(15.50)	(8.65)	(8.00)	(5.25)	(4.14)	(4.51)	(6.71)	(9.33)	(6.09)	(8.48)
Brazil	Value	953.23	459.24	1115.56	493.71	1128.67	1443.47	3550.10	2867.58	1271.02	1184.22	688.38	731.35
	Share in total (%)	(6.54)	(2.51)	(4.37)	(2.68)	(5.55)	(4.44)	(7.32)	(9.85)	(3.93)	(3.28)	(2.13)	(2.96)
China	Value	2303.16	3161.12	4910.82	4292.32	5999.53	7324.40	9447.76	7715.36	9679.43	10201.90	13701.24	9713.91
	Share in total (%)	(15.81)	(17.30)	(19.22)	(23.30)	(29.48)	(22.54)	(19.47)	(26.49)	(29.96)	(28.23)	(42.40)	(39.31)
Cote d'Ivoire	Value	578.15	34.50	32.20	22.57	27.02	104.53	138.00	67.25	162.66	164.41	363.00	0.00
	Share in total (%)	(3.97)	(0.19)	(0.13)	(0.12)	(0.13)	(0.32)	(0.28)	(0.23)	(0.50)	(0.46)	(1.12)	(0.00)
France	Value	1303.27	1028.96	1245.91	1331.76	1962.45	2587.57	2873.16	736.96	1244.58	1167.15	1438.22	1279.77
	Share in total (%)	(8.95)	(5.63)	(4.88)	(7.23)	(9.64)	(7.96)	(5.92)	(2.53)	(3.85)	(3.23)	(4.45)	(5.18)
Germany	Value	920.69	1278.00	1577.74	1907.00	304.91	205.23	3013.29	954.19	1544.48	1782.56	1164.41	864.09
	Share in total (%)	(6.32)	(7.00)	(6.18)	(10.35)	(1.50)	(0.63)	(6.21)	(3.28)	(4.78)	(4.93)	(3.60)	(3.50)
Ghana	Value	393.93	54.47	70.19	45.17	26.92	6.56	512.04	73.18	280.27	103.11	0.00	51.87
	Share in total (%)	(2.70)	(0.30)	(0.27)	(0.25)	(0.13)	(0.02)	(1.06)	(0.25)	(0.87)	(0.29)	(0.00)	(0.21)
India	Value	852.10	1109.75	1443.21	1023.98	1241.88	2377.30	2470.16	2887.64	2109.55	2774.33	2286.61	1742.86
	Share in total (%)	(5.85)	(6.07)	(5.65)	(5.56)	(6.10)	(7.32)	(5.09)	(9.92)	(6.53)	(7.68)	(7.08)	(7.05)
Italy	Value	703.76	781.21	824.15	729.88	665.23	1997.79	1800.31	747.72	769.00	1028.60	0.00	533.74
	Share in total (%)	(4.83)	(4.28)	(3.23)	(3.96)	(3.27)	(6.15)	(3.71)	(2.57)	(2.38)	(2.85)	(0.00)	(2.16)
Japan	Value	518.70	757.23	748.29	759.55	967.74	1143.35	2891.37	981.13	600.33	798.70	358.83	333.31
	Share in total (%)	(3.56)	(4.15)	(2.93)	(4.12)	(4.76)	(3.52)	(5.96)	(3.37)	(1.86)	(2.21)	(1.11)	(1.35)
Netherlands	Value	1331.84	706.39	1015.56	445.42	210.35	351.21	1512.33	518.56	2417.67	2842.17	3239.71	2476.93
	Share in total (%)	(9.14)	(3.87)	(3.97)	(2.42)	(1.03)	(1.08)	(3.12)	(1.78)	(7.48)	(7.87)	(10.03)	(10.02)
Norway	Value	47.97	48.57	72.98	94.97	120.88	318.46	386.82	213.38	490.28	625.23	368.27	459.98
	Share in total (%)	(0.33)	(0.27)	(0.29)	(0.52)	(0.59)	(0.98)	(0.80)	(0.73)	(1.52)	(1.73)	(1.14)	(1.86)
Singapore	Value	165.88	359.66	241.16	321.92	546.72	513.76	790.06	397.99	354.86	237.23	210.93	117.52
	Share in total (%)	(1.14)	(1.97)	(0.94)	(1.75)	(2.69)	(1.58)	(1.63)	(1.37)	(1.10)	(0.66)	(0.65)	(0.48)
South Africa	Value	527.69	403.33	640.88	512.22	550.64	487.42	794.16	715.46	856.89	940.47	644.60	438.38

	Share in total (%)	(3.62)	(2.21)	(2.51)	(2.78)	(2.71)	(1.50)	(1.64)	(2.46)	(2.65)	(2.60)	(2.00)	(1.77)
Spain	Value	267.78	190.32	224.40	83.16	72.36	305.10	977.61	305.65	951.62	770.40	341.54	241.35
	Share in total (%)	(1.84)	(1.04)	(0.88)	(0.45)	(0.36)	(0.94)	(2.02)	(1.05)	(2.95)	(2.13)	(1.06)	(0.98)
Sweden	Value	255.11	112.43	92.86	207.21	249.21	381.06	346.19	439.59	261.38	270.80	248.23	179.54
	Share in total (%)	(1.75)	(0.62)	(0.36)	(1.12)	(1.22)	(1.17)	(0.71)	(1.51)	(0.81)	(0.75)	(0.77)	(0.73)
Turkey	Value	98.56	77.79	91.84	104.35	321.92	269.53	1005.58	274.13	363.75	462.71	313.98	241.60
	Share in total (%)	(0.68)	(0.43)	(0.36)	(0.57)	(1.58)	(0.83)	(2.07)	(0.94)	(1.13)	(1.28)	(0.97)	(0.98)
United Arab Emirates	Value	6.39	242.44	632.23	911.93	741.91	1804.28	780.42	666.41	546.43	752.40	0.00	92.88
	Share in total (%)	(0.04)	(1.33)	(2.47)	(4.95)	(3.65)	(5.55)	(1.61)	(2.29)	(1.69)	(2.08)	(0.00)	(0.38)
United Kingdom	Value	1487.68	2700.96	1715.12	1228.09	1541.63	1234.67	1698.64	2360.68	2338.24	1825.46	1620.65	1285.35
	Share in total (%)	(10.21)	(14.79)	(6.71)	(6.67)	(7.58)	(3.80)	(3.50)	(8.11)	(7.24)	(5.05)	(5.02)	(5.20)
United States	Value	1580.79	3590.74	4893.16	2313.08	2041.59	7936.54	11517.28	4886.97	3900.04	4833.55	3354.25	1829.89
	Share in total (%)	(10.85)	(19.66)	(19.15)	(12.56)	(10.03)	(24.42)	(23.74)	(16.78)	(12.07)	(13.38)	(10.38)	(7.41)
Average		728.49	913.40	1277.45	921.09	1017.46	1624.93	2425.71	1456.10	1615.61	1806.76	1615.53	1235.50
Maximum		2303.16	3590.74	4910.82	4292.32	5999.53	7936.54	11517.28	7715.36	9679.43	10201.90	13701.24	9713.91
Highest Maximum Share (%)		(15.81)	(19.66)	(19.22)	(23.30)	(29.48)	(24.42)	(23.74)	(26.49)	(29.96)	(28.23)	(42.40)	(39.31)

Source: Author's calculation based on World Integrated Trade Solution (WITS) database, 2017.

Notes: SITC Revision 2 is reported as it contained data of more years.

2.3.2 Commodity Structure of Nigeria's Exports to its major Trading Partners

The major commodities which Nigeria exports to its trading partners include animal and vegetable oils, fats and waxes; beverages and tobacco; chemicals and related products; commodities and transactions; crude materials, inedible, except fuels; food and live animals; machinery and transport equipment; manufactured goods classified; miscellaneous manufactured articles and mineral fuels, lubricants and related materials. Observably, Nigeria's export of mineral fuels, lubricants and relations strongly dominates all other commodities which it exports to its trading partners.

Table 2.7 shows that the value of Nigeria's export of mineral fuels, lubricants and related materials to all its major trading partners increased from US$39.40 billion in 2005 to US$67.37 billion in 2008. This accounted for about 96.81 percent and 94.80 percent of the total merchandise exports value of all commodities exported. In 2009, export dropped to US$35.20 billion but still accounted for about 94.53 percent of total merchandise exports to trading partners. The reduction during this year was attributed to the 2008-2009 global economic meltdown.

Moreover, Nigeria still maintains lead in export of mineral fuels, lubricants and related materials over the period 2010-2016. However, its value is lower particularly, between 2015 and 2016 relative to the periods covered by this study. The decrease in value could be partly due to changing structure in the international energy market (i.e., an increase in supply of oil to major consuming countries without a corresponding increase in demand from them). The average value of export of mineral fuels, lubricants and related materials for these periods stood at US$57.86 billion,accounting for about 92.44 percent of the total value of merchandise exports to major trading partners. However, the contributions of all other commodities exports are insignificant as none of them has up to 10 percent contribution to total value of merchandise exports.

Generally, only one commodity out of the ten merchandise exports performed significantly better. This indicates over reliance on a single commodity.

Table 2.7: Nigeria's Export of Selected Commodities to its major Trading Partners (Trade value in Million US$)

Commodities Structure		Total Exports to all the major Trading Partners											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Food and live animals	Value	537.75	14.18	585.50	561.07	422.19	1002.55	718.61	4877.49	2783.95	997.23	765.04	967.07
	Share in total (%)	(1.32)	(0.03)	(1.24)	(0.79)	(1.13)	(1.47)	(0.76)	(4.19)	(3.72)	(1.21)	(1.66)	(3.29)
Beverages and tobacco	Value	7.26	1.15	23.02	36.40	50.87	104.17	151.09	269.90	91.52	71.09	22.40	45.73
	Share in total (%)	(0.02)	(0.002)	(0.05)	(0.05)	(0.14)	(0.15)	(0.16)	(0.23)	(0.12)	(0.09)	(0.05)	(0.16)
Crude materials, inedible,except fuels	Value	207.22	214.31	479.14	659.74	454.17	1592.26	7332.15	8179.92	2681.10	724.37	917.91	731.36
	Share in total (%)	(0.51)	(0.41)	(1.01)	(0.93)	(1.22)	(2.33)	(7.76)	(7.03)	(3.58)	(0.88)	(2.00)	(2.49)
Mineral fuels,lubricants and related materials	Value	39403.2	50996.2	44347.9	67369.9	35200.7	61494.5	83383.8	99444.1	67252.8	75157.5	43237.6	27056.6
	Share in total (%)	(96.81)	(98.65)	(93.76)	(94.80)	(94.53)	(89.95)	(88.29)	(85.52)	(89.83)	(91.12)	(94.01)	(92.03)
Animal and vegetable oils,fats and waxes	Value	0.18	0.003	0.014	0.74	0.25	0.92	1.07	0.54	8.50	6.15	0.73	6.00
	Share in total (%)	(0.0004)	(0.00001)	(0.00003)	(0.001)	(0.0007)	(0.0013)	(0.0011)	(0.0005)	(0.011)	(0.007)	(0.002)	(0.02)
Chemicals and related products	Value	4.02	72.77	120.54	957.05	203.73	249.90	205.90	227.90	190.89	127.96	50.91	91.24
	Share in total (%)	(0.01)	(0.14)	(0.25)	(1.35)	(0.55)	(0.37)	(0.22)	(0.20)	(0.25)	(0.16)	(0.11)	(0.31)
Manufactured goods classified by material	Value	202.25	90.03	541.91	678.18	556.36	2583.12	1254.11	1775.35	1091.79	1502.86	329.18	311.20
	Share in total (%)	(0.50)	(0.17)	(1.15)	(0.95)	(1.49)	(3.78)	(1.33)	(1.53)	(1.46)	(1.82)	(0.72)	(1.06)
Machinery and transport equipment	Value	44.02	239.24	236.27	567.58	254.09	775.08	1202.12	1280.65	452.25	2344.89	55.80	61.43
	Share in total (%)	(0.11)	(0.46)	(0.50)	(0.80)	(0.68)	(1.13)	(1.27)	(1.10)	(0.60)	(2.84)	(0.12)	(0.21)
Miscellaneous manufactured articles	Value	16.19	67.86	307.85	232.33	68.79	491.50	123.70	183.04	254.98	1546.54	34.06	25.87
	Share in total (%)	(0.04)	(0.13)	(0.65)	(0.33)	(0.18)	(0.72)	(0.13)	(0.16)	(0.34)	(1.88)	(0.07)	(0.09)
Commodities and transactions not elsewhere classified	Value	281.26	0.25	655.09	0.0003	27.35	73.86	65.37	48.78	58.00	2.47	577.30	103.94
	Share in total (%)	(0.69)	(0.0005)	(1.39)	(3E-07)	(0.07)	(0.11)	(0.07)	(0.04)	(0.08)	(0.003)	(1.26)	(0.35)
Total		40703.3	51695.9	47297.3	71063.1	37238.5	68367.8	94437.9	116287	74865.8	82481.0	45990.9	29400.5
Maximum		39403.2	50996.2	44347.9	67369.9	35200.7	61494.5	83383.8	99444.1	67252.8	75157.5	43237.6	27056.6
Highest Maximum Share (%)		(96.81)	(98.65)	(93.76)	(94.80)	(94.53)	(89.95)	(88.29)	(85.52)	(89.83)	(91.12)	(94.01)	(92.03)

Source: Author's calculation based on World Integrated Trade Solution (WITS) database, 2017.Notes: SITC Revision 2 is reported as it contained data of more years.

2.3.3 Commodity Structure of Nigeria's Imports from its major Trading Partners

Table 2.8 shows the merchandise imports of commodities Nigeria imports from major trading partners over the period 2005-2016. The table reveals thatimports of machinery and transport equipment dominated all other commodities. Import of the saidcommodities increased from US$5.46 billion in 2005 to US$17.55 billion in 2010. This averages US$9.96 billion, accounting for about 45.15 percent of total imports value for the periods. Increased imports during the period was as a result of stability in government and revenue increase from crude oil.

Imports of manufactured goods classified chiefly by material, chemicals and related products and food and live animals were followed with average of US$4.31 billion, US$2.52 billion and US$2.43 billion. These commodities also accounted for about 19.76 percent, 11.76 percent and 11.26 percent, respectively. In 2011, import of machinery and transport equipment despite taking the lead among other commodities dropped to US$ 16.33 billion and continued up to 2013 when it recorded US$11.67 billion. Its average share of total merchandise imports value for the periods also fell to 38.91 percent.

In 2014, however, Nigeria'simport of machinery and transport equipment increased to US$14.06 billion, but significantly dropped to US$6.31 billion in 2016. This could be explained in part by the development of domestic industry in the country. Also, a fall in foreign reserve and political regime shift during the period could have accounted for the decline in import.Despite this, import of these commodities dominated all others and as well accounted for about 25.52 percent of the total value of merchandise imports from major trading partners.

Table 2.8also shows that mineral fuels, lubricants and related materials (i.e., refined petroleum) are among the leading imported products after machinery and transport equipment since 2011. Such increase may be connected to the distortion instigated by the fuel subsidy scheme operated in the country. Refined petroleum imported between 2011 and 2016 averaged US$4.59 billion, accounting for 13.65 percent after manufactured goods classified chiefly by material. The latter commodity accounted for 16.45 percent of the total imports value during the periods.

Table 2.8:Nigeria's Import of Selected Commodities from Major Trading Partners (Trade value in Million US$)

Commodities Structure		Total Exports to all the major Trading Partners											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Food and live animals	Value	1558.34	2908.96	4435.80	1285.47	1655.35	2752.98	11087.9	5362.58	4126.05	4136.31	2481.60	1945.41
	Share in total (%)	(10.70)	(15.92)	(17.36)	(6.98)	(8.13)	(8.47)	(22.86)	(18.41)	(12.77)	(11.45)	(7.68)	(7.87)
Beverages and tobacco	Value	57.13	97.45	217.91	109.16	102.56	144.04	259.70	460.17	208.54	255.41	250.91	221.31
	Share in total (%)	(0.39)	(0.53)	(0.85)	(0.59)	(0.50)	(0.44)	(0.54)	(1.58)	(0.65)	(0.71)	(0.78)	(0.90)
Crude materials, inedible,except fuels	Value	93.12	159.64	296.77	312.65	223.35	338.91	3351.28	288.67	1191.94	438.50	229.28	244.98
	Share in total (%)	(0.64)	(0.87)	(1.16)	(1.70)	(1.10)	(1.04)	(6.91)	(0.99)	(3.69)	(1.21)	(0.71)	(0.99)
Mineral fuels,lubricants and related materials	Value	2147.63	526.36	431.24	256.37	167.02	468.58	5587.31	647.76	4921.13	6265.70	5561.86	4536.15
	Share in total (%)	(14.74)	(2.88)	(1.69)	(1.39)	(0.82)	(1.44)	(11.52)	(2.22)	(15.23)	(17.34)	(17.21)	(18.36)
Animal and vegetable oils,fats and waxes	Value	31.18	56.78	80.43	82.58	24.90	72.15	218.44	115.55	134.72	174.46	75.72	22.67
	Share in total (%)	(0.21)	(0.31)	(0.31)	(0.45)	(0.12)	(0.22)	(0.45)	(0.40)	(0.42)	(0.48)	(0.23)	(0.09)
Chemicals and related products	Value	1419.37	2624.20	3688.28	2034.54	2492.13	2842.08	3436.72	2964.06	3707.65	3845.07	3453.32	3184.41
	Share in total (%)	(9.74)	(14.36)	(14.44)	(11.04)	(12.25)	(8.75)	(7.08)	(10.18)	(11.47)	(10.64)	(10.69)	(12.89)
Manufactured goods classified by material	Value	2536.36	3119.99	5596.77	4132.92	4050.18	6453.56	6114.75	4554.33	5227.37	5615.64	6520.86	4588.23
	Share in total (%)	(17.41)	(17.08)	(21.91)	(22.43)	(19.90)	(19.86)	(12.60)	(15.64)	(16.18)	(15.54)	(20.18)	(18.57)
Machinery and transport equipment	Value	5461.68	7336.21	9914.03	9251.60	10218.9	17552.6	16332.4	13668.3	11674.3	14060.7	9107.72	6306.77
	Share in total (%)	(37.49)	(40.16)	(38.80)	(50.22)	(50.22)	(54.01)	(33.67)	(46.93)	(36.13)	(38.91)	(28.19)	(25.52)
Miscellaneous manufactured articles	Value	788.04	607.68	883.34	946.30	1230.01	1861.64	2116.26	1051.25	1109.41	1331.87	4214.02	3327.14
	Share in total (%)	(5.41)	(3.33)	(3.46)	(5.14)	(6.04)	(5.73)	(4.36)	(3.61)	(3.43)	(3.69)	(13.04)	(13.46)
Commodities and transactions not elsewhere classified	Value	476.91	830.77	4.48	10.23	184.74	12.12	9.37	9.33	11.13	11.48	415.21	332.77
	Share in total (%)	(3.27)	(4.55)	(0.02)	(0.06)	(0.91)	(0.04)	(0.02)	(0.03)	(0.03)	(0.03)	(1.29)	(1.35)
Total		14569.8	18268.1	25549.1	18421.8	20349.2	32498.6	48514.2	29121.9	32312.2	36135.1	32310.5	24709.8
Maximum		5461.68	7336.21	9914.03	9251.60	10218.9	17552.6	16332.4	13668.3	11674.3	14060.7	9107.72	6306.77
Highest Maximum Share (%)		(37.49)	(40.16)	(38.80)	(50.22)	(50.22)	(54.01)	(33.67)	(46.93)	(36.13)	(38.91)	(28.19)	(25.52)

Source: Author's calculation based on World Integrated Trade Solution (WITS) database, 2017. Notes: SITC Revision 2 is reported as it contained data of more years.

2.3.4 Product Analysis of Nigeria's Exports and Imports

The analysis of commodities structure of Nigeria's exports between 2005 and 2016 show that one of the salient features of Nigeria's export sector is the country's concentration on a single product (Table 2.7). As a developing country, mineral fuels, lubricants and relatedmaterials constitute Nigeria's major exports share to its trading partners.For the past two decades, mineral fuels, lubricants and related materials amongst other products have constituted more than 90 percent of Nigeria's merchandise export to each of its major trading partners.This implies that non-oil export in total merchandize export is insignificant.

In 2014 for instance, Nigeria's export of mineral fuels, lubricants and related materials to Brazil was valued at US$8.31 billion, accounting for about 99.94 percent of total exports value to Brazil. None of the other exported products to Brazil recorded up to 1 percent. However, total value of same productsexported to France alone wasvalued at US$5.66 billion, accounting for 96.01 percent of total exports value to France. This was followed by export of machinery and transport equipment (US$0.14 billion),accounting for 2.33 percent.Similarly, none of other exports products to France recorded up to 1 percent (See Table 2.9).

Furthermore, export of same products to India werevalued at US$14.68 billion, constituting 97.96 percent of total exports value to India. None of other products exported to this country are significant though manufactured goods classified chiefly by material (US$0.21 billion) accounted for about 1.41 percent of total exports value to India.

Nigeria's exports of the products in question were also dominant among its major trading partners, except Belgium and UAE.[16]Percentage share of total exports value

[16]Nigeria's exports value of mineral fuels, lubricants and related materials to its trading partners is shown in the bracket:China (US$1.51 billion), Cote d'Ivoire (US$2.27 billion), Germany (US$1.59 billion), Ghana (US$0.62 billion), Italy (US$3.55 billion), Japan (US$2.99 billion), Netherlands (US$9.58 billion), Norway (US$0.12 billion), Singapore (US$0.34 billion), South Africa (US$5.09 billion), Spain (US$8.77 billion), Sweden (US$ 1.49 billion), Turkey (US$1.84 billion), United Kingdom (US$3.15 billion) and United States (US$3.61 billion).

ofsame products to each of the trading partners was above 90 percent with the exception of UK (60.51 percent), Ghana (64.51 percent), Italy (78.88 percent), Singapore (80.94 percent), Turkey (82.11 percent) and Norway (80.49 percent) (Table 2.9). As of 2014, Nigeria's export of same commodities to United States started falling, due to the production of fracking shell oil which led to a shale gas boom in the US.

Table 2.10 shows the structure of Nigeria's imports from its major trading partners in 2014. For instance, imports of food and live animals dominated all other commodities imported from Brazil (US$0.83 billion),accounteing for 69.73 percent of total import value. This was followed by chemicals and related products valued at US$0.12 billion, accounting for 10.13 percent of total import value from Brazil. During 2014, Nigeria's import of refined petroleum (35.70 percent) outweighed all other products imported from France. Import of machinery and transport equipment (19.98 percent) followed and then chemicals and related products (15.47 percent of total import value from France).Equally, import of machinery and transport equipment among all commodities imported from India took the lead over other commodities, recording US$1.40 billion (50.47 percent). Imports of chemicals and related products followed and then manufactured goods classified chiefly by material accounted for 19.14 percent and 14.29 percent, respectively of total import value from India. More so, import ofrefined petroleum products constituted about 56.16 percent, 44.97 percent, 70.25 percent and 70.13 percent of total import value from Netherlands, Spain, Belgiumand Norway. Lastly, machinery and transport equipment imported from China, Germany, Italy, Japan, Singapore, South Africa, Sweden, UAE, UK and US overshadowed all other commodities imported. They constituted 50.17 percent, 57.52 percent, 58.34 percent, 50.40 percent, 43.57 percent, 36.52 percent, 66.20 percent, 51.90 percent, 46.72 percent and 47.74 percent, respectively.

Table 2.9: Product Analysis of Nigeria's Exports in 2014 (Trade value in Million US$)

Countries/Products	Food and live animals	Beverages and tobacco	Crude materials,inedible, except fuels	Mineral fuels,lubricants and related materials	Animal and vegetable oils,fats and waxes	Chemicals and related products	Manufactured goods classified by material	Machinery and transport equipment	Miscellaneous manufactured articles	Commodities and transactions not elsewhere classified	Total	Maximum
Belgium	40.905	Na	7.69	na	Na	2.13	6.14	17.18	0.19	0.18	74.41	40.91
Brazil	0.064	0.0003	0.40	8311.02	Na	1.48	2.57	0.10	0.01	na	8315.64	8311.02
China	7.128	0.0292	88.52	1510.50	3.43	5.41	12.44	37.57	4.67	na	1669.69	1510.50
Cote d'Ivoire	3.808	26.2815	0.16	2266.49	0.08	18.17	4.44	7.61	2.99	0.98	2331.02	2266.49
France	25.919	0.0002	31.60	5662.33	Na	4.51	1.22	137.33	34.74	0.09	5897.74	5662.33
Germany	60.925	0.0041	59.24	1588.17	0.09	1.47	17.15	10.72	0.40	na	1738.17	1588.17
Ghana	75.567	34.1455	0.78	621.07	Na	50.85	29.43	125.66	24.41	0.83	962.73	621.07
India	37.928	0.0576	54.81	14675.67	0.20	0.66	211.35	0.20	0.11	na	14980.99	14675.67
Italy	3.141	Na	8.15	3552.99	0.50	1.12	527.47	8.81	402.14	na	4504.32	3552.99
Japan	0.263	0.0054	167.53	2988.82	Na	na	100.96	0.42	Na	na	3258.00	2988.82
Netherlands	537.104	0.0245	29.19	9576.76	Na	28.66	38.56	42.79	239.54	na	10492.63	9576.76
Norway	na	Na	na	117.67	0.35	na	Na	24.30	3.88	na	146.20	117.67
Singapore	5.333	Na	9.66	339.60	Na	0.14	0.81	63.75	0.32	na	419.60	339.60
South Africa	3.110	0.8291	3.12	5090.44	0.71	0.25	1.04	1.57	0.90	na	5101.96	5090.44
Spain	48.166	Na	17.27	8774.15	Na	0.98	322.87	65.72	349.34	na	9578.49	8774.15
Sweden	0.546	Na	na	1486.40	Na	na	Na	0.33	0.11	na	1487.39	1486.40
Turkey	1.500	Na	211.12	1836.46	Na	Na	8.22	12.48	166.33	0.33	2236.43	1836.46
United Arab Emirates	5.219	0.0297	9.79	0.04	Na	0.05	70.37	4.84	35.32	0.02	125.66	70.37
United Kingdom	37.183	9.6328	10.50	3149.65	0.80	11.45	72.01	1743.87	170.12	0.03	5205.24	3149.65
United States	103.423	0.0513	14.84	3609.27	Na	0.62	75.83	39.67	111.04	na	3954.74	3609.27

Source: Author's calculation based on World Integrated Trade Solution (WITS) database, 2017;

Notes: SITC Revision 2 is reported as it contained data of more years.

Table 2.10: Product Analysis of Nigeria's Imports in 2014 (Trade value in Million US$)

Countries/Products	Food and live animals	Beverages and tobacco	Crude materials,inedible,except fuels	Mineral fuels,lubricants and related materials	Animal and vegetable oils,fats and waxes	Chemicals and related products	Manufactured goods classified by material	Machinery and transport equipment	Miscellaneous manufactured articles	Commodities and transactions not elsewhere classified	Total	Maximum
Belgium	149.61	12.98	11.51	2367.19	0.37	191.03	193.44	424.95	18.53	0.04	3369.66	2367.19
Brazil	825.70	31.56	24.09	17.84	Na	119.93	78.05	84.49	2.56	na	1184.2	825.70
China	389.31	14.30	128.18	33.56	3.67	1152.22	2605.13	5118.51	750.38	6.65	10201.9	5118.51
Cote d'Ivoire	7.40	Na	5.58	40.85	100.16	5.33	0.55	2.46	2.08	na	164.41	100.16
France	161.96	3.41	11.06	416.68	2.52	180.52	122.55	233.21	34.93	0.33	1167.2	416.68
Germany	94.55	21.49	14.40	34.44	0.20	248.49	254.40	1025.26	89.27	0.05	1782.6	1025.26
Ghana	31.16	35.11	0.74	0.35	16.27	1.79	12.07	3.26	2.36	na	103.11	35.11
India	245.78	24.60	18.08	69.54	4.77	530.94	396.46	1400.25	81.44	2.46	2774.3	1400.25
Italy	14.03	4.06	12.12	122.58	0.25	94.13	159.34	600.04	21.88	0.17	1028.6	600.04
Japan	0.80	0.00	73.90	0.10	Na	29.33	279.68	402.54	12.36	0.00	798.70	402.54
Netherlands	671.24	3.45	3.79	1596.23	4.84	77.09	138.17	330.19	17.07	0.10	2842.2	1596.23
Norway	110.92	Na	7.46	438.48	Na	3.67	25.25	34.96	4.49	na	625.23	438.48
Singapore	8.34	0.61	3.36	0.96	0.81	61.51	44.88	103.37	13.38	0.03	237.23	103.37
South Africa	75.21	9.58	2.30	15.30	0.20	238.79	218.58	343.41	37.00	0.09	940.47	343.41
Spain	23.58	8.13	34.00	346.47	0.83	145.22	110.11	93.87	8.19	na	770.40	346.47
Sweden	35.50	0.70	2.89	0.15	Na	13.49	38.10	179.27	0.69	na	270.80	179.27
Turkey	9.69	0.96	32.47	16.95	0.27	38.41	216.82	129.63	17.46	0.06	462.71	216.82
United Arab Emirates	59.03	2.05	16.03	27.44	0.05	89.87	137.43	390.53	29.72	0.25	752.40	390.53
United Kingdom	179.44	49.35	8.14	190.27	2.25	204.09	253.96	852.78	85.01	0.18	1825.5	852.78
United States	1043.06	33.08	28.37	530.33	37.00	419.21	330.68	2307.70	103.05	1.07	4833.6	2307.70

Source: Author's calculation based on World Integrated Trade Solution (WITS) database, 2017;

Notes: SITC Revision 2 is reported as it contained data of more years.

2.3.5 Sectoral Analysis of Nigeria's Exports and Imports

The sectoral composition of trade reflects the countries'comparative advantage in the production of specific products along with consumers' patterns of demand. Tables 2.11 and 2.12 show further classifications of various export and import commodities by sector. It can be seen in Table 2.11 that over the period 2005-2016, the largest export of Nigeria was the oil sector. Exports for this sector increased from US$39.40 billion in 2005 to US$99.44 billion in 2012. This increase was influenced mainly by favourable international crude oil price. However, export of oil sector dropped significantly to US$67.25 billion in 2013, though it improved a bit in 2014 to US$75.16 billion but significantly dropped in 2016 to US$27.06 billion, accounting for about 92.03 percent of total merchandise exports.

With reduction in the export of oil in recent time, the summation of exports of both agriculture and manufacturing sectors is still insignificant as both constituted less than 10 percent of total merchandise exports value. Average exports values of agriculture and manufacturing sectors for the periods 2005-2016 wereUS$3.28 billion and US$2.18 billion, accounting for about 4.35 percent and 3.21 percent, respectively.

On the other hands, sectoral classifications revealed that imports of the manufacturing sector dominated from 2005 to 2016. It increased from US$10.68 billion in 2005 to US$28.72 billion in 2010, but declined to US$17.74 billion in 2016 following the development of local industry (See Table 2.12). Over these periods, average imports of the manufacturing sector recorded US$20.57 billion, accounting for about 76.11 percent. In contrast, average imports of the agriculture and oil sectors recorded US$4.53 billion and US$2.63 billion, accounting for about 15.15 percent and 8.74 percent of total merchandise imports value.

Table 2.11: Sectoral Analysis of Nigeria's Merchandize Exports toits major Trading Partners (Trade value in Million US$)

Sectors		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Value	752.41	229.64	1087.67	1257.95	927.48	2699.90	8202.91	13327.84	5565.07	1798.84	1706.07	1750.17
AGRICULTURAL*	Share in total (%)	(1.85)	(0.44)	(2.30)	(1.77)	(2.49)	(3.95)	(8.69)	(11.46)	(7.43)	(2.18)	(3.71)	(5.95)
	Value	547.74	470.15	1861.66	2435.14	1110.32	4173.46	2851.21	3515.72	2047.91	5524.72	1047.25	593.68
MANUFACTURING**	Share in total (%)	(1.35)	(0.91)	(3.94)	(3.43)	(2.98)	(6.10)	(3.02)	(3.02)	(2.74)	(6.70)	(2.28)	(2.02)
	Value	39403.19	50996.15	44347.99	67369.98	35200.65	61494.46	83383.80	99444.05	67252.82	75157.48	43237.55	27056.60
OIL***	Share in total (%)	(96.81)	(98.65)	(93.76)	(94.80)	(94.53)	(89.95)	(88.29)	(85.52)	(89.83)	(91.12)	(94.01)	(92.03)
Total		40703.34	51695.95	47297.33	71063.08	37238.45	68367.82	94437.91	116287.61	74865.8	82481.04	45990.87	29400.45
Maximum		39403.19	50996.15	44347.99	67369.98	35200.65	61494.46	83383.8	99444.054	67252.82	75157.48	43237.55	27056.60
Highest Maximum Share (%)		(96.81)	(98.65)	(93.76)	(94.80)	(94.53)	(89.95)	(88.29)	(85.52)	(89.83)	(91.12)	(94.01)	(92.03)

Source: Author's calculation based on World Integrated Trade Solution (WITS) database, 2017;

Notes:

SITC Revision 2 is reported as it contained data of more years.

* Values recorded for crude materials, inedible, except fuels;beverages and tobacco; animal and vegetable oils, fats and waxes; food and live animals were added up and classified as agricultural sector.

** Values recorded for machinery and transportequipment;miscellaneous manufactured articles; manufactured goods classified chiefly by material; chemicals and related products; and commodities and transactions not elsewhere classified wereadded up and classified as manufacturing sector.

*** Value of mineral fuels, lubricants and related materials constituted oil sector.

The classification for agriculture, manufacturing and oil sectors is based on data from WITS.

Table 2.12: Sectoral Analysis of Nigeria's Merchandize Imports fromits major Trading Partners (Trade value in Million US$)

Sectors		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Value	1739.76	3222.83	5030.92	1789.86	2006.16	3308.08	14917.36	6226.96	5661.24	5004.68	3037.52	2434.49
AGRICULTURAL*	Share in total (%)	(11.94)	(17.64)	(19.69)	(9.72)	(9.86)	(10.18)	(30.75)	(21.38)	(17.52)	(13.85)	(9.40)	(9.85)
	Value	10682.36	14518.85	20086.89	16375.58	18176.03	28721.96	28009.54	22247.28	21729.87	24864.72	23711.13	17739.32
MANUFACTURING**	Share in total (%)	(73.32)	(79.48)	(78.62)	(88.89)	(89.32)	(88.38)	(57.73)	(76.39)	(67.25)	(68.81)	(73.39)	(71.79)
	Value	2147.63	526.36	431.24	256.37	167.02	468.58	5587.31	647.76	4921.13	6265.70	5561.86	4536.15
OIL***	Share in total (%)	(14.74)	(2.88)	(1.69)	(1.39)	(0.82)	(1.44)	(11.52)	(2.22)	(15.23)	(17.34)	(17.21)	(18.36)
Total		14569.75	18268.05	25549.05	18421.81	20349.20	32498.62	48514.21	29121.99	32312.23	36135.10	32310.51	24709.95
Maximum		10682.36	14518.85	20086.89	16375.58	18176.03	28721.96	28009.54	22247.28	21729.87	24864.72	23711.13	17739.32
Highest Maximum Share (%)		(73.32)	(79.48)	(78.62)	(88.89)	(89.32)	(88.38)	(57.73)	(76.39)	(67.25)	(68.81)	(73.39)	(71.79)

*Source:*Author's calculation based on World Integrated Trade Solution (WITS) database, 2017;

Notes:

SITC Revision 2 is reported as it contained data of more years.

* Values recorded for crude materials, inedible, except fuels;beverages and tobacco; animal and vegetable oils, fats and waxes; food and live animals were added up and classified as agricultural sector.

** Values recorded for machinery and transportequipment;miscellaneous manufactured articles; manufactured goods classified chiefly by material; chemicals and related products; and commodities and transactions not elsewhere classified wereadded up and classified as manufacturing sector.

*** Value of mineral fuels, lubricants and related materials constituted oil sector.

The classification for agriculture, manufacturing and oil sectors is based on data from WITS.

2.4 Linkage between Trade Costs Indicators and Nigeria's Bilateral Trade Flows

This sub-section establishes a nexus between trade costs indicators and bilateral trade flows (i.e., bilateral exportson one hand andbilateral imports on the other hand). Nigeria's average total exports and imports is considered for the analysis, and further disaggregated them into oil and non-oil.

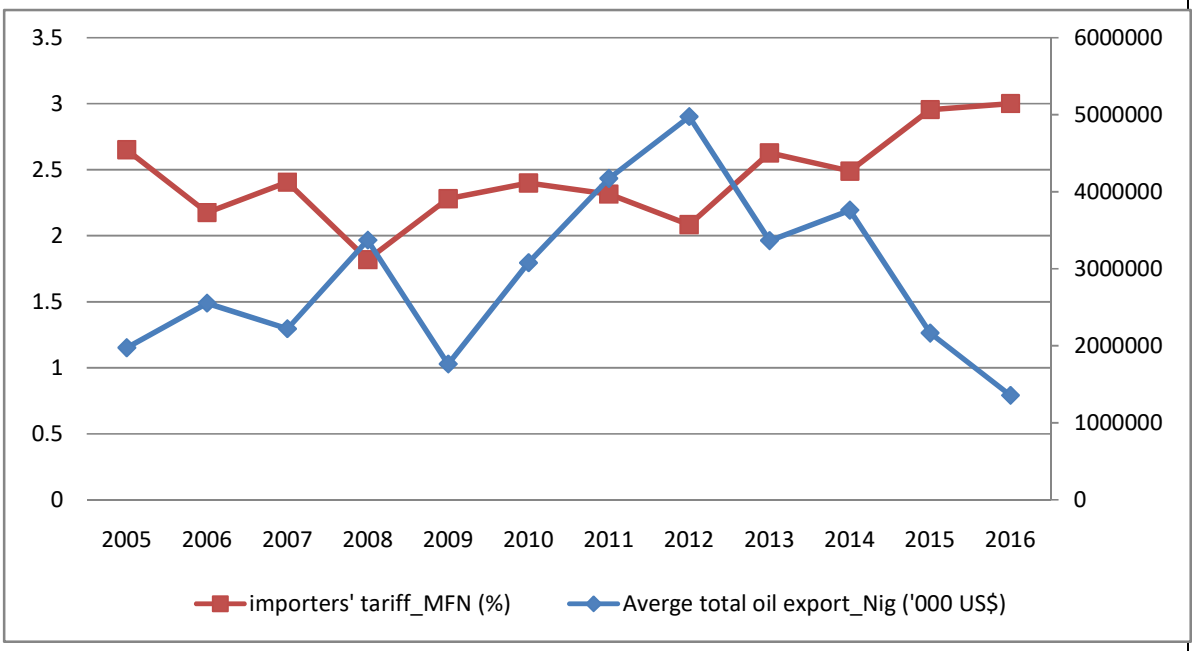
2.4.1 Trade Costs Indicators and Nigeria's Bilateral Exports

The analysis of the link between average oil exports of Nigeria to her major trading partners and weighted average tariff rate (for primary products) imposed by these partners over time is shown in Figure 2.11. Nigeria's average oil exports recorded frequent fluctuations over the period of 2005-2016. One of the determinants of these fluctuations is tariff rate imposed by trading partners. Nigeria's average oil exports stood at US$ 1970.16 million in 2005 but significantly rose by about 29.42 percent in 2006 due to a reduction in tariff rate in the importing countries from 2.6 percent in 2005 to 2.2percent in 2006. Between 2008 and 2009, average oil exports of Nigeria drastically reduced by about 47.75 percent. This may have been the influence of the global financial crisis.

Notwithstanding, marginal increase in tariff rate by 0.5percent during the period also had significant contribution. However, continuous fall in tariff rate between 2010 and 2012 raised average oil exports by 61.71percent. Finally, over the period of 2014-2016, Nigeria's average oil exports again recorded significant reduction of about 64.0percent, while tariff rate at the same time increased persistently, recording 2.49percent, 2.95percent and 2.99percent in 2014, 2015 and 2016, respectively.

Non-oil export fell from US$65.01 million in 2005 to US$34.99 million in 2006 despite reduction in tariff rate (for all products). A marginal reduction in tariff rate (0.47percent) in the previous year significantly led to increase in non-oil export in 2008 by 25.22percent, though fell again by about 44.82percent in 2009. This may be explained by the global financial crisis coupled with high tariff rate during the period.

Panel A: Average Oil Export and Importers' Tariff Rate (%)



Panel B: Averagenon-Oil Export and Importers' Tariff Rate (%)

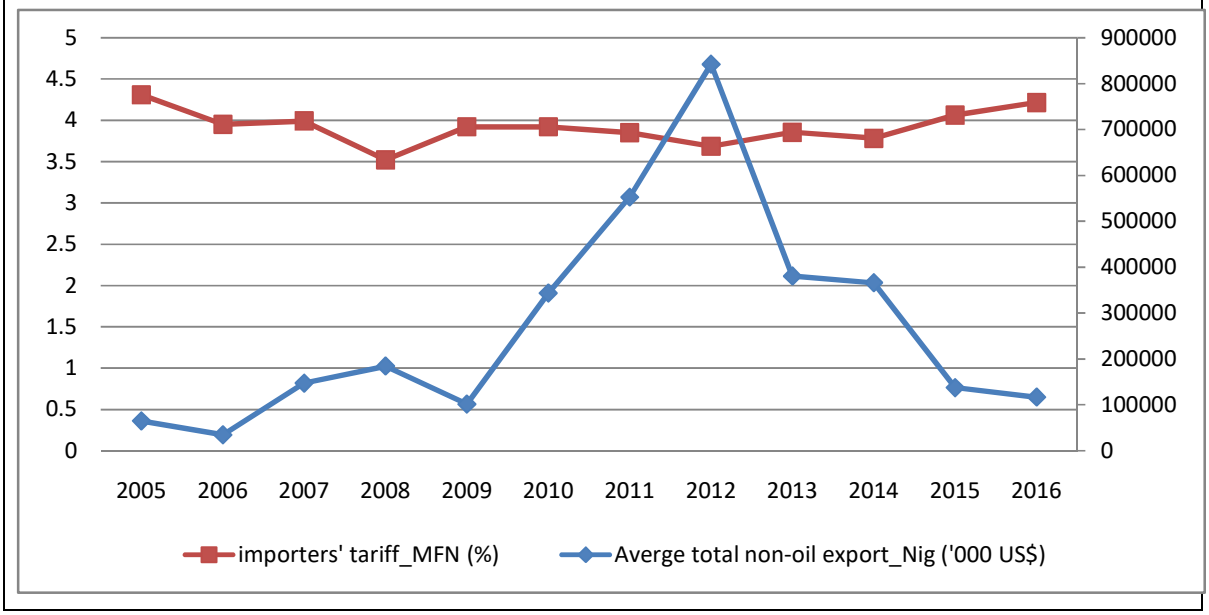


Figure 2.11: Average Oil and Non-Oil Exports (Nigeria) and Importers' Tariff Rate (%)

Source: Author's Computation based on data from WITS and WDI (2018).

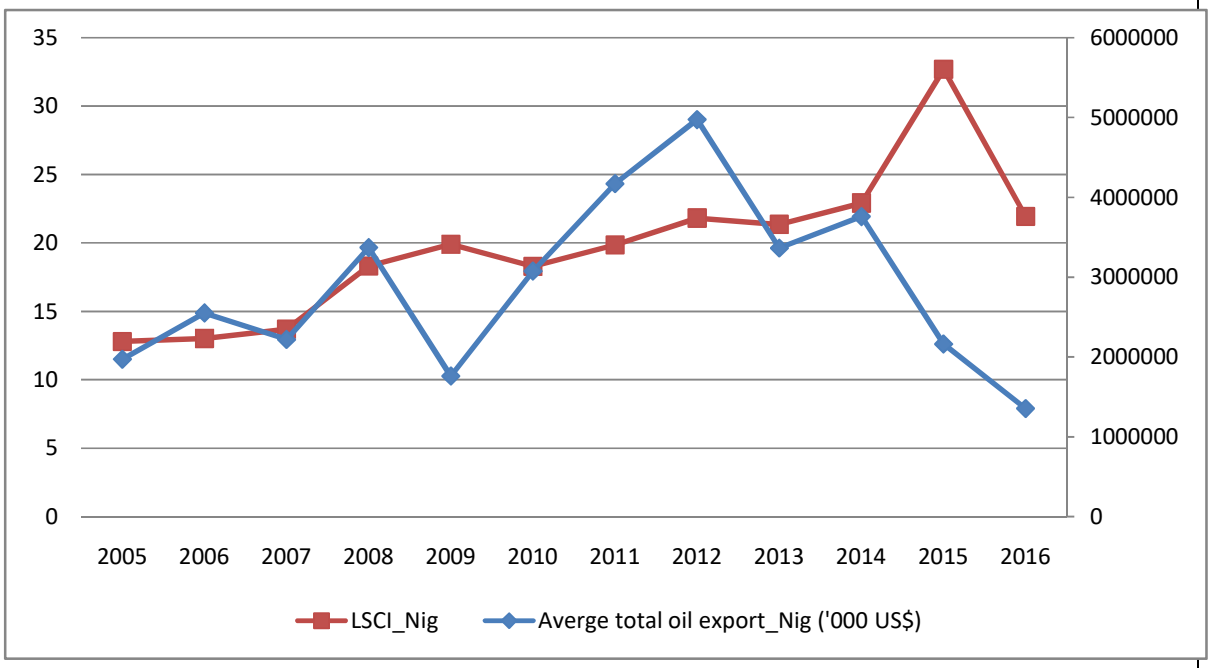
Between 2010 and 2012, weighted tariff rate for all products recorded continuous fall and this induced non-oil export upwards by 145.06percent. Conversely, continuous reduction was also recorded in the non-oil export between 2013 and 2016 due to persistent increase in tariff rate during the period (See Figure 2.11).

Concerning trade-related infrastructure, an improvement in connectivity of acountry's maritime shipping implies trade facilitation (i.e., trade costs reduction), thus boost trading activities in international market, and vice-versa. The analysis of the relationship between Nigeria's connectivity index and its average oil and non-oil exports over a period 2005-2016 is shown in Figure 2.12. There exists direct relationship between Nigeria's connectivity index and its average oil export between 2005 and 2008. Nigeria's connectivity index maintained an upwards trend of 12.79 in 2005 to 18.3 in 2008, resulting to an increase in average oil export from US$1,970.16 million in 2005 to US$3,368.49 million in 2008 (about 70.98percent increase).

In 2009 however, Nigeria's average oil export drastically fell by 47.8percent despite continuous improvement in its connectivity index. This could be as a result of the global financial crises. On the other hand, Nigeria'sconnectivity index fell in 2010 while average oil export rose again by 74.7percent. Between 2011 and 2012, an upwards trend was observed for both Nigeria's connectivity index and its average oil export, but recorded a downward trend in 2013 (See Figure 2.12).

Finally, from 2014 to 2016, Nigeria's average oil export has been maintaining a downwards trend despite an improvement in its connectivity index during the periods, except in 2016. This could be due to instability experienced in the economy. The link between average non-oil export and connectivity index also reveal similar trend. For instance, the duo maintained direct relationship from 2007 to 2008, but with an inverse relationship in 2009. Again, direct relationship (upwards trend) was recorded between 2010 and 2012, and also downwards trend between 2013 and 2016 except in 2015.

Panel A: Average Oil Export and Nigeria's LSCI



Panel B: Average non-Oil Export and Nigeria's LSCI

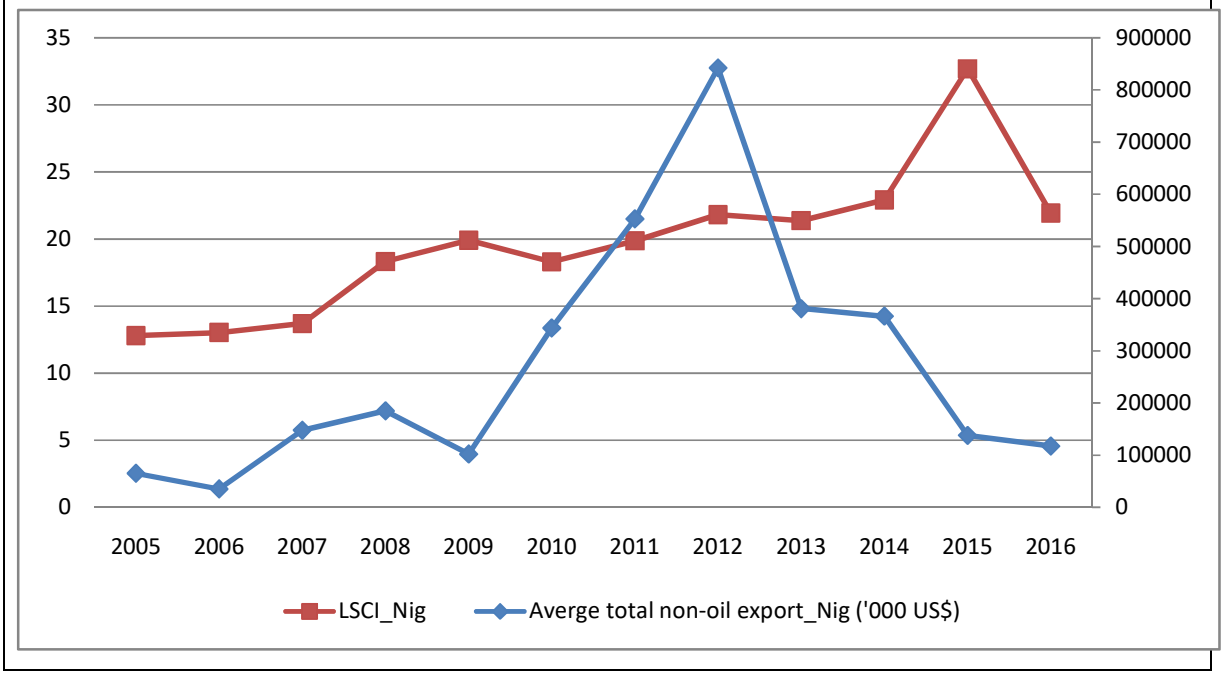


Figure 2.12: Nigeria's Liner Shipping Connectivity Index and Average Oil and Non-Oil Exports

Source: Author's Computation based on data from WITS and UNCTADstat (2018).

In bilateral trade relations, the potential relationship between trade flows and trade costs indicators required measuresthe degree of export and import transaction costsfor both exporting and importing countries. It is clear that trade flows can only be encouraged if export and import transaction costs between trading partners are bearable. If export transaction costs in the exporting country is affordable without reciprocity by the importing country, it implies that trade flows would be hindered.

Figure 2.13 therefore shows the link between Nigeria's average oil/non-oil exports and trade transaction costs. In 2006, for instance, reducing the number of documents and time to export in Nigeria coupled with similar action by importing countries significantly boosts Nigeria's average oil export by about 29.42percent, but lowers non-oil export by 46.18percent. Between 2007 and 2013, average time and documents required in the importing countries fell gradually. Also, time to export in Nigeria fell continuously, except number of documents that was relatively stable, recording an average of 9 over these periods.

However, Nigeria's average oil and non-oil exports have been seriously fluctuating. They fell significantly from US$3,368.49 million and US$184.66 million in 2008 to US$1,760.03 million and US$101.89 million in 2009, rose again to US$3,074.72 million and US$343.67 million in 2010, and increased steadily till 2012 when it recorded US$4,972.20 million and US$842.18 million, respectively. Due to the implementation of TFA in December 2013, export and import transaction costs for both exporting and importing countries significantly reduced. As a result, Nigeria's average oil export increased by 11.75percent while non-oil export fell by 3.8percent in 2014 relative to their values in the previous year. Both oil and non-oil exports fell steadily in 2015 and 2016. This indicates that reduction in export and import transaction costs by the exporter and importer had no significant impact on Nigeria's average oil and non-oil exports. Rather, the influence of economic recession strongly dominated during the period which may have been responsible for the fluctuation.

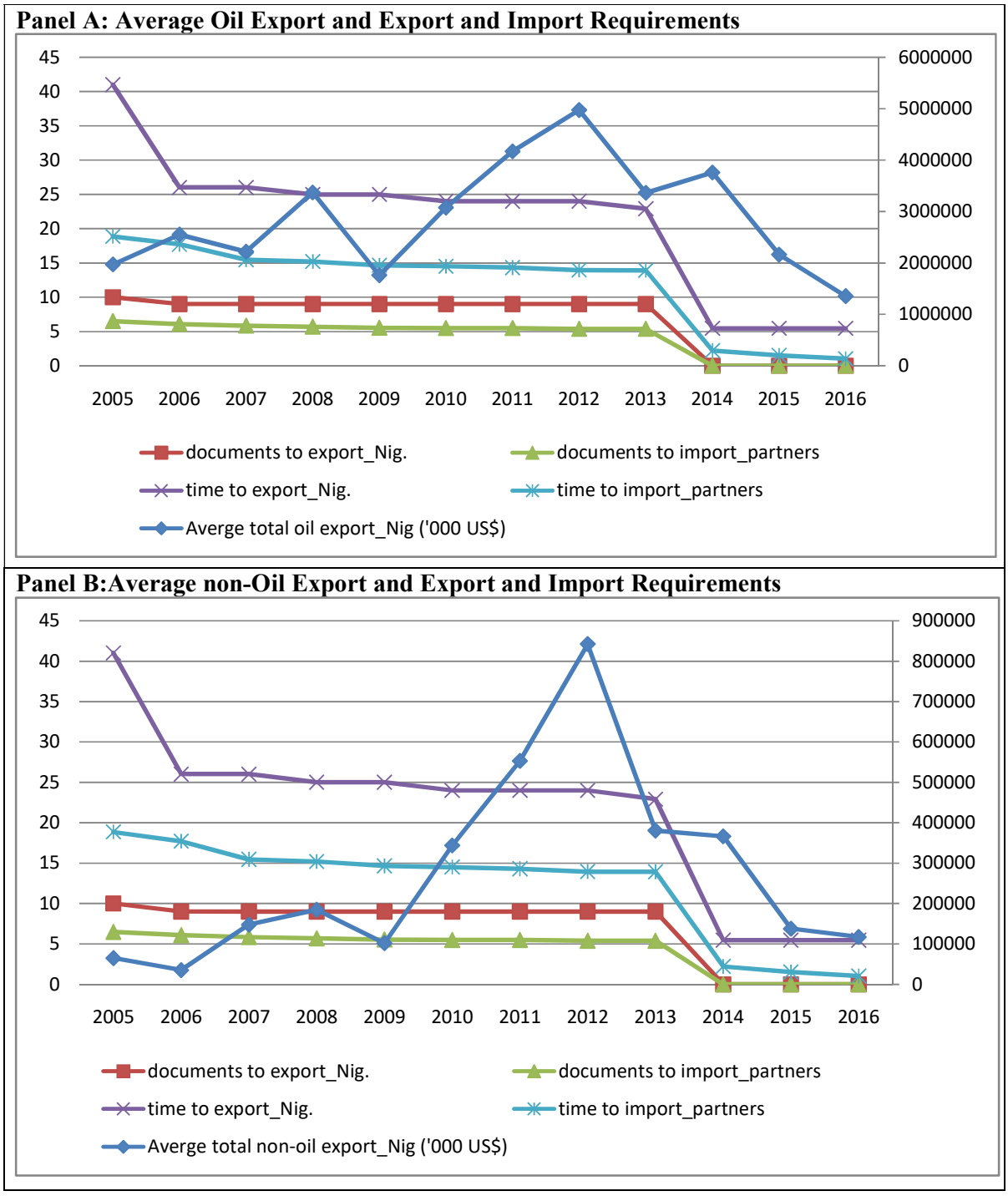


Figure 2.13: Nigeria's Average Oil and Non-Oil Exports, Requirements to Export and Import by the Trading Partners

Source: Author's Computation based on data from WITS and WDI (2018).

Figure 2.14 shows that quality of institutions (rule of law, control of corruption and regulatory quality) in Nigeria had no effect both on average oil and non-oil exports. Over time, it has been very weak, recording negative. However, the quality of institutions of the trading partners, on average, relatively maintainspositive and even stability during the period. Also, it has positive relationship with Nigeria's average oil and non-oil export virtually in most of the periods, except in 2013.

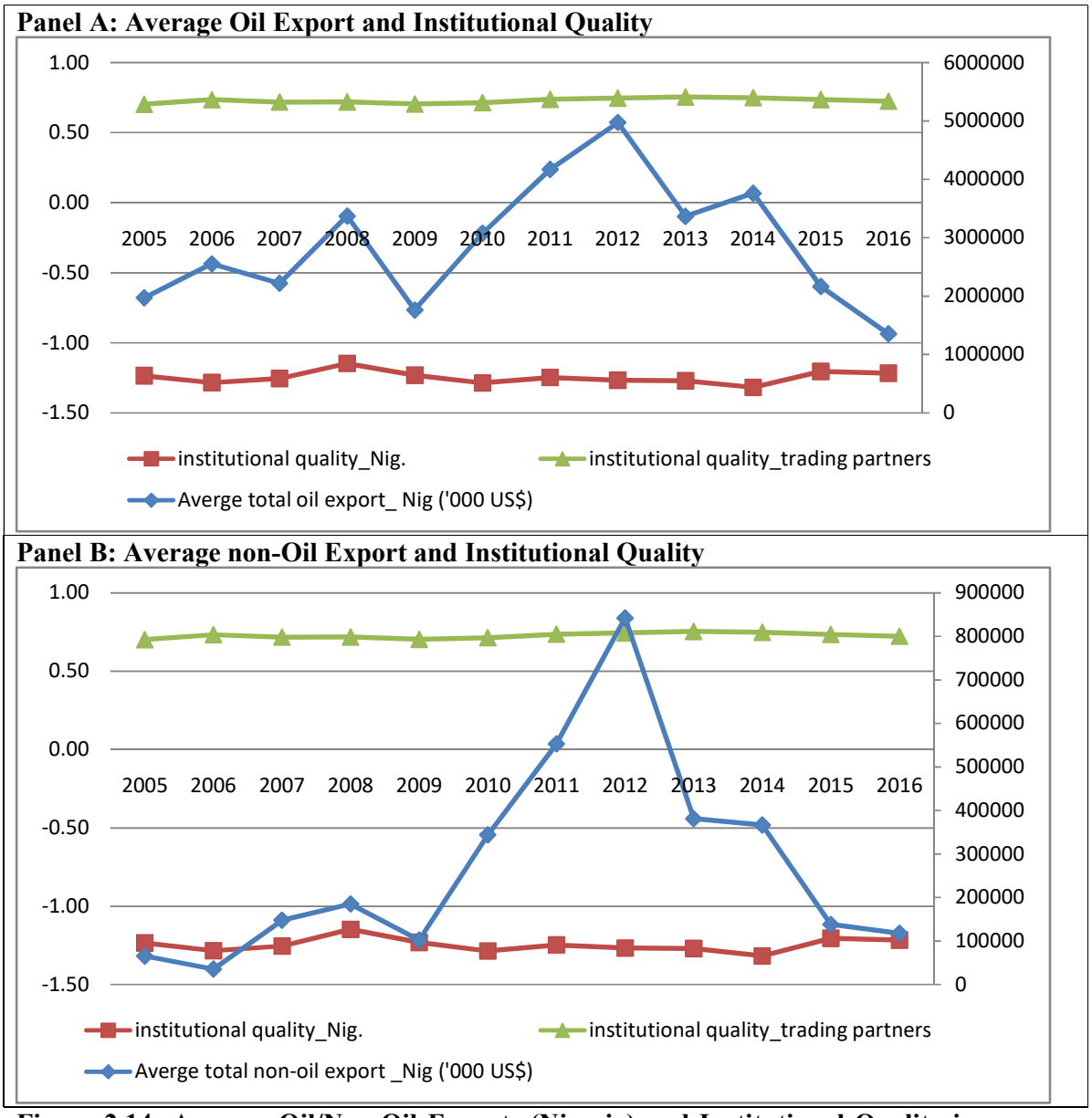


Figure 2.14: Average Oil/Non-Oil Exports (Nigeria) and Institutional Quality in Nigeria and of the Trading Partners

Source: Author's Computation based on data from WITS and WGI (2018).

2.4.2 Trade Costs Indicators and Nigeria's Bilateral Imports

An analysis of the nexus between trade costs indicators and bilateral trade flows is incomplete without establishing similar connection for bilateral imports as well. Figure 2.15 reveals the link between Nigeria's average oil imports and weighted average tariff rate imposed on primary products imported over the period 2005-2016. Nigeria's average oil imports significantly fell from US$107.38 million in 2005 to US$21.56 million in 2007. This may be ascribed to double-digit tariff rate (13.06percent) imposed during the period. Between 2008 and 2009, tariff rate fell tremendously by about 3.36percent without any effect on average oil imports (US$8.35 million), as it even fell below the value recorded in previous years. The fall in average oil imports during these periods may be a reflection of the 2008-2009 global financial crises.

However, in 2010, average oil imports marked significant improvement. This may likely be associated with a marginal fall in tariff rate by 0.1percent. Again in 2012, weighted tariff rate recorded double-digit (10.47percent) which led to significant decrease in average oil imports by 88.41percent. On the contrary, a marginal fall in tariff rate by 0.57percent in 2013 gave rise to an increase in average oil import by 659.72percent, above its value in previous years. Finally, Nigeria recorded persistent decrease in its average oil imports during the periods 2014-2016. This could be attributed largely to economic recession except in 2016 which partiallyreflect influence of high tariff rate.

The link between Nigeria's average non-oil imports and weighted average tariff rate on all products show direct link during the period 2005-2007, but inverse relationship in 2008. Over the periods 2009-2011 and 2013-2014, the duo again maintained a direct relationship (upward trend), while downward trend was recorded in 2012 and 2015, respectively.

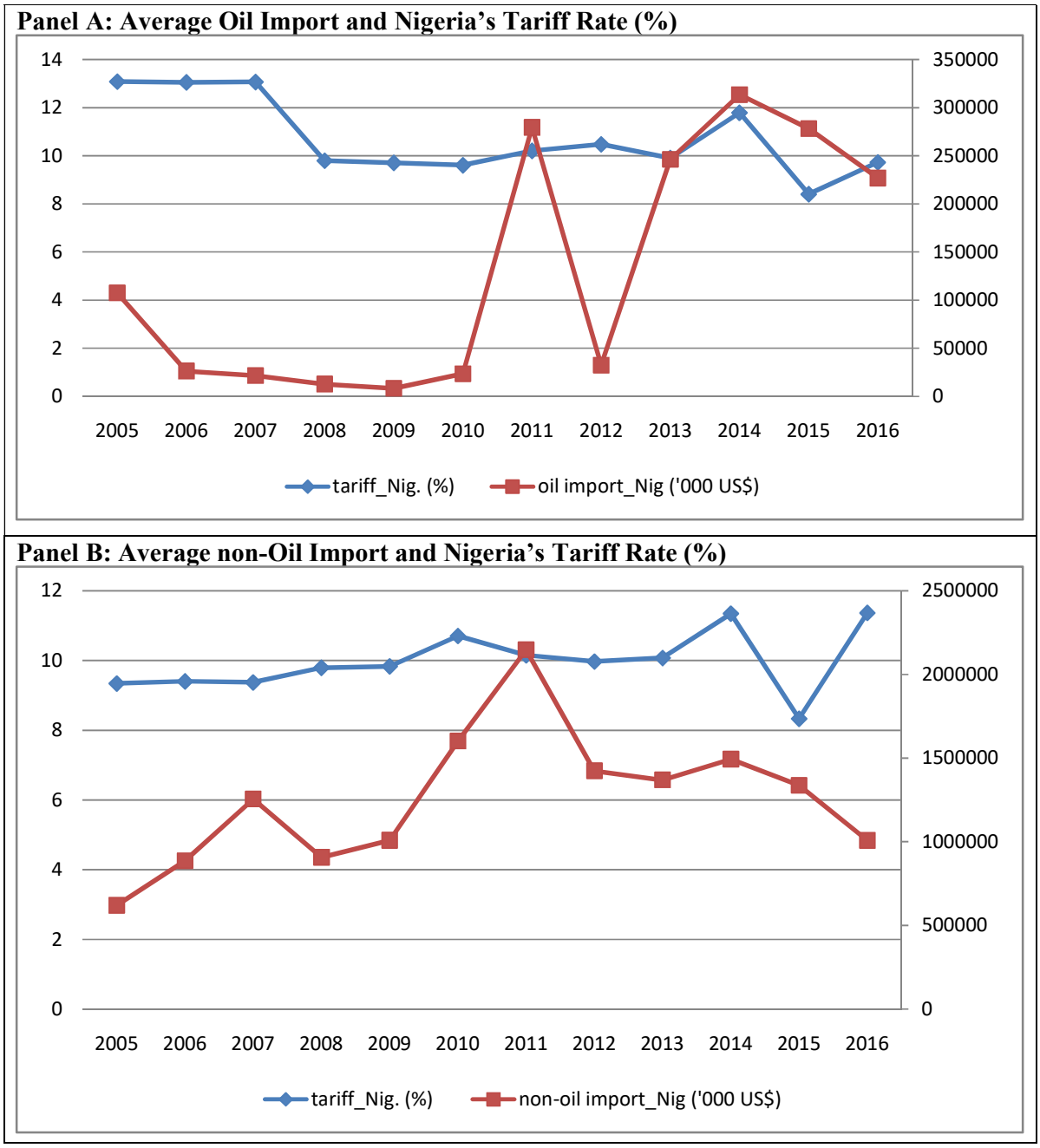
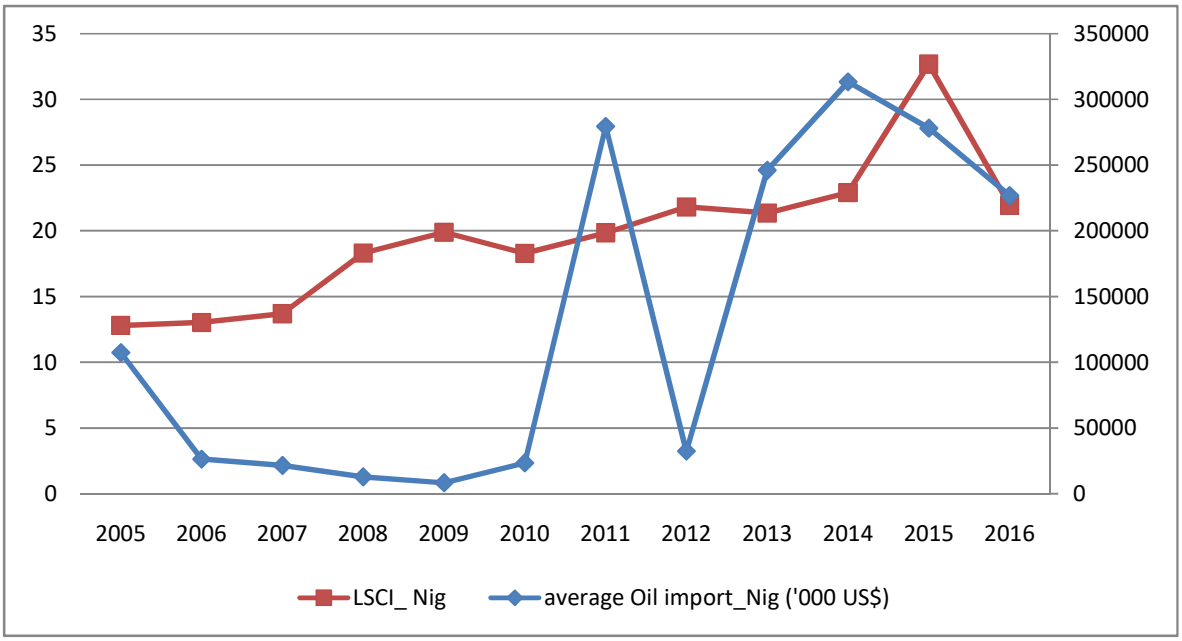


Figure 2.15: Average Oil and Non-Oil Imports and Tariff Rate (%) in Nigeria
Source: Author's Computation based on data from WITS and WDI (2018).

Contrary to the case of export, there exists an indirect relationship between Nigeria's average oil import and its connectivity index. For instance, while Nigeria's connectivity index maintained an upward trend from 12.79 in 2005 to 19.89 in 2009, average oil import significantly fell from US$107.38 million in 2005 to US$8.36 million in 2009. The reduction in oil import accounted for about 92.22 percent decrease. Conversely, the period between 2010 and 2011 revealed a direct relationship between the pairs as both maintained an upward trend. Again in 2012, Nigeria's average oil import drastically fell to US$32.39 million from 279.36 million in 2011, accounting for 88.41percent decline despite an improvement in connectivity index to 21.81 from 19.85 in 2011.

In 2013, Nigeria recorded low connectivity index (21.35) while its average oil import significantly increased by 659.72percent relative to their values in 2012 (See Figure 2.16). From 2014 to 2016, Nigeria's average oil export has been maintaining a downward trend even though connectivity index showed significant improvement between 2014 and 2015, before it eventually dropped again in 2016. However, a direct link was maintained between average non-oil import and connectivity index for the period 2005-2007 though inversely related in 2008. Between 2009 and 2013, both pairs have been seriously fluctuating.

Panel A: Average Oil Import and Nigeria's LSCI



Panel B: Average non-Oil Import and Nigeria's LSCI

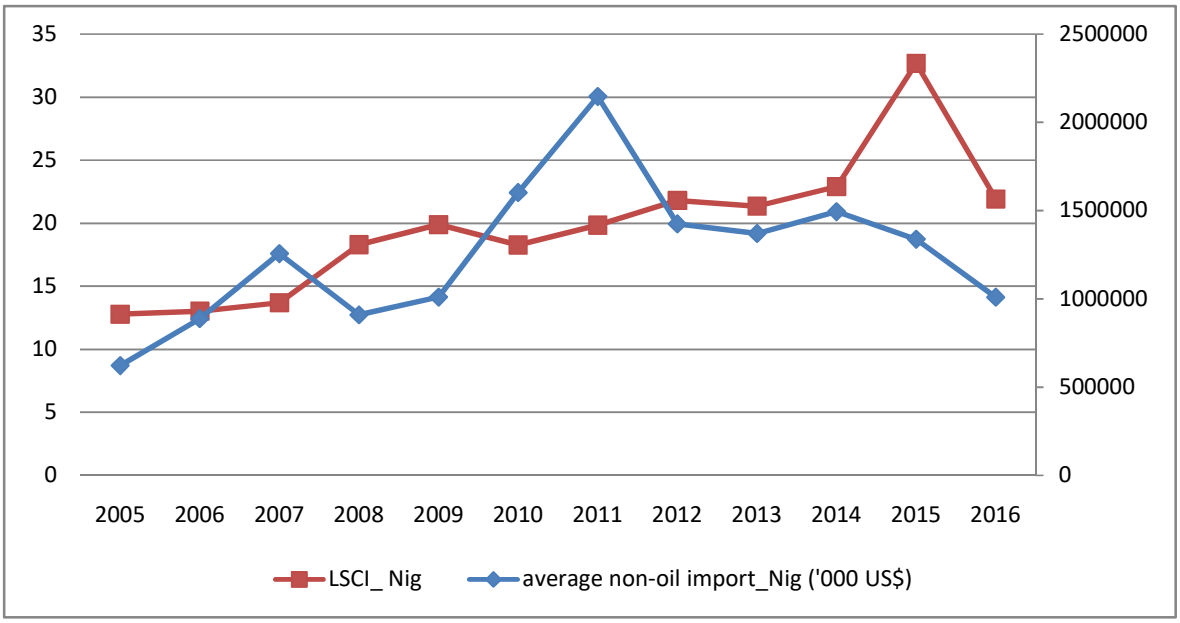


Figure 2.16: Nigeria's Liner Shipping Connectivity Index and Average Oil and Non-Oil Imports

Source: Author's Computation based on data from WITS and UNCTADstat (2018).

Similarly, the nexus between Nigeria's average oil import, number of documents and time to import in Nigeria and to export in the exporting country is shown in Figure 2.17. Between the periods 2005-2009, there exists direct relationship between Nigeria's average oil import, import transaction costs in Nigeria and export transaction costs in the exporting country. For instance, while time and number of documents to import in Nigeria reduced, similar action is taking in the exporting country without any effect on Nigeria's average oil import (See Figure 2.17). From 2010, Nigeria's average oil import gradually increases, recording US$279.37 million in 2011 even with relatively stable import and export transaction costs during the period. Again, it fell in 2012 to an all-time low but restored back in 2013 to US$246.06 million. With TFA, both export and import transaction costs reduced significantly and thus boost Nigeria's average oil import in 2014 by about 27.32percent, above its value in the previous year. In 2015, however, it fell drastically and continued up to 2016. This may be ascribed to economic recession.

On the contrary, Figure 2.17 shows an inverse relationship between Nigeria's average non-oil import, import transaction costs in Nigeria and export transaction costs in the exporting country during the period 2005-2007. In 2008, however, a direct relationship was observed between the pairs and again maintained an inverse relationship over the period 2009-2011. Between 2012 and 2013, despite reduction in all requirements to export and import, except number of documents to import that relatively stable, Nigeria's average non-oil import dropped and continues till 2016, even with the implementation of TFA.

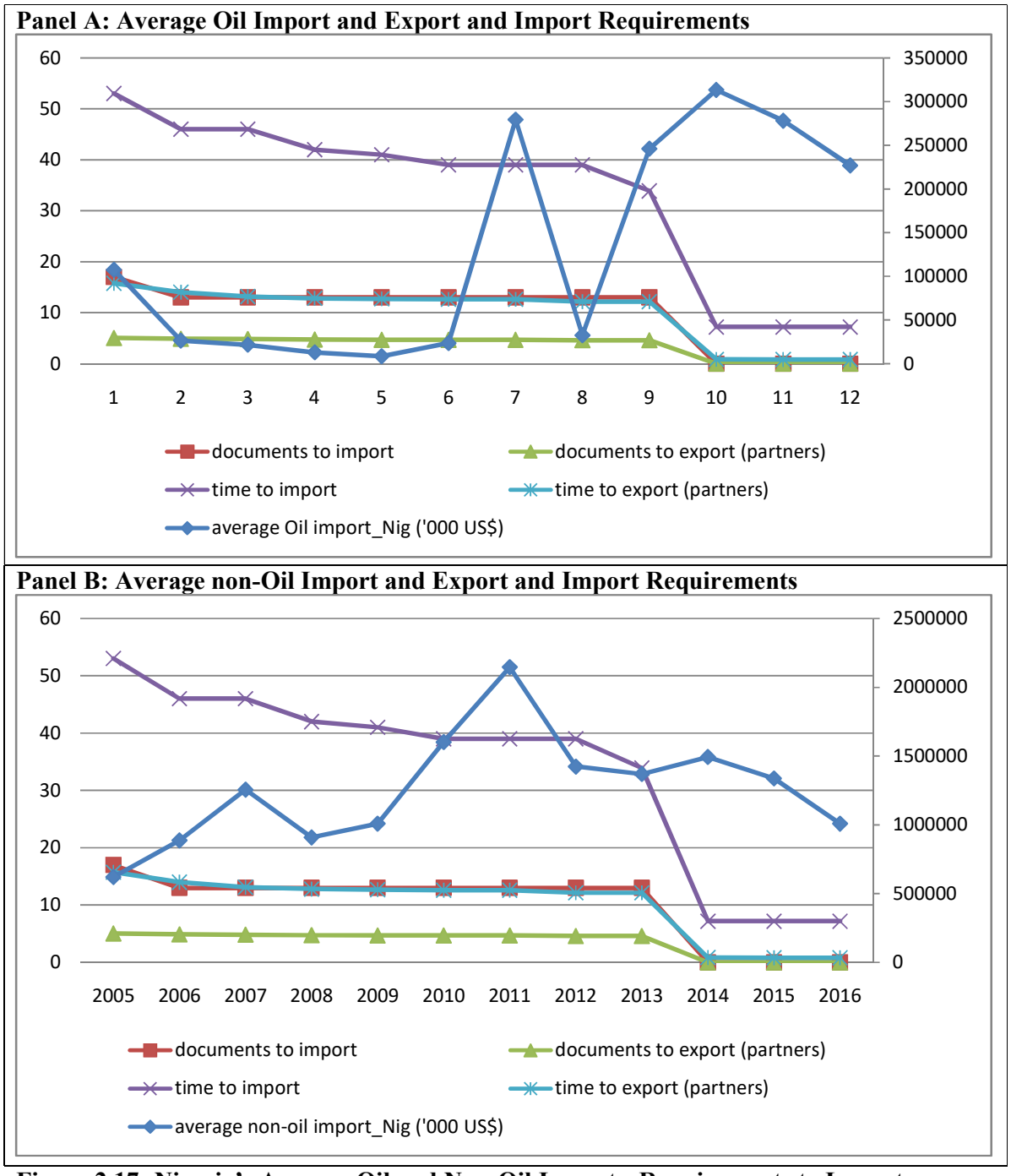


Figure 2.17: Nigeria's Average Oil and Non-Oil Imports, Requirements to Import and Export by Trading Partners

Source: Author's Computation based on data from WITS and WDI (2018).

Similar to the scenario in Figure 2.14, the same relationship is also established between Nigeria's average oil/non-oilimports, quality of its institutions and that of the trading partners. As depicted in Figure 2.18, the quality of institutions in Nigeria does not affect its average oil and non-oil imports, perhaps due to their weak nature. Conversely, the quality of institutions of trading partners, on average, has direct linkage with Nigeria's average oil and non-oil imports for the period under consideration.

From the analyses above, it is shown that the indicators of trade costs mentioned earlier could affect Nigeria's bilateral exports and imports with its trading partners, either positively or negatively. Essentially, trade costs indicators constituted by tariff rate, quality of institutions, quality of shipping connectivity index, time and documentsrequired to export and import significantly influenced both oil and non-oil trade.

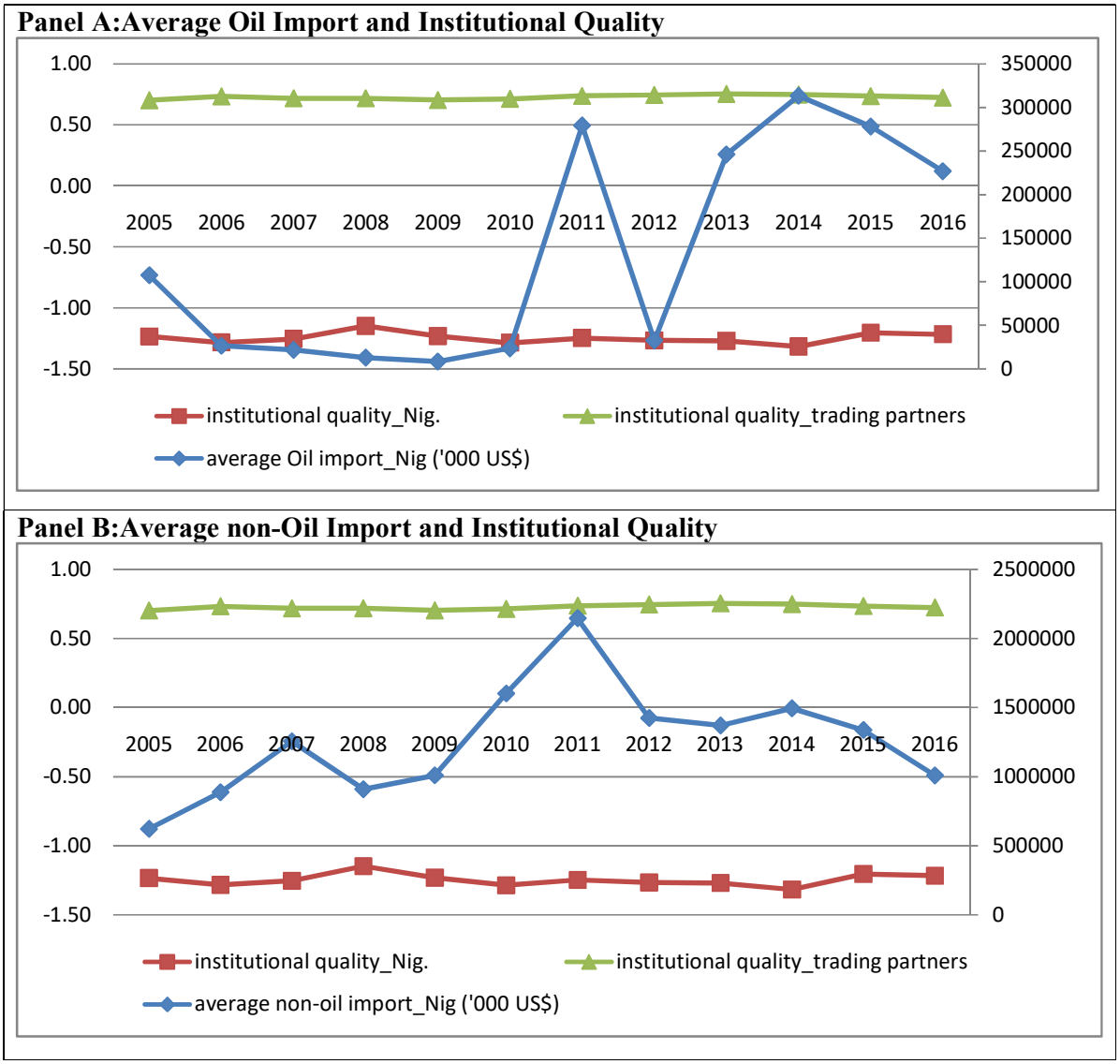


Figure 2.18: Average Oil and Non-Oil Imports (Nigeria) and Institutitonal Quality in Nigeria and by the Trading Partners
Source: Author's Computation based on data from WITS and WGI (2018).

2.5 A Review of Nigeria's Trade Policy

Ever since last trade policy review in 2011, Nigeria has continued to strengthen trade liberalization measures. This is aimed at encouraging production, promoting competition and efficiency, and thus lessens the cost of doing business (WTO, 2017). These measures are commonly used to increase international confidence in the economy. Various measures taken by Nigeria since 1991 are as follows:

2.5.1 Tariff Measures

Nigeria's trade policy has been rather protective. In recent times, Nigeriahas made efforts with other sub-regional partners, to liberalize trade so as to reap benefits connected to trade liberalization. Nigeria's acceptance of ECOWAS CET was a major effort. Prior to consenting to the CET, maximum tariff in Nigeria peaked at 150 percent (in 2005) but reduced to 35 percent (in 2010).This indicates that Nigeria's trading activities have been liberalized with the transition by about 76.6 percent. (WTO, 2011). Imports responded accordingly, recording an increase of about 967 percent in 2011 compared to the 1990 level.

2.5.2 Customs and Ports Reforms

The issue of congestion has been long in the Nigerian Ports.Mostly, the mandatory Import Duty Report (IDR) is avoided while clearing goods. Genuine importers are affected by long delays experiencedbefore their goods are cleared.Customs Service was not adequately equipped to handle the ports. Consequently, Government lost substantial amounts of revenue. In 1995,for instance, about N8 billion was lost due to malpractices at the ports (WTO, 1998).

Subsequent to these, various form of reform measures were put in place since June 1995. One of these measures required the importers to pay their customs duties through any of six selected banks. In 1996, there was promulgation of Ports Related Offences and a task force on sea-port security to streamline the activities of the security agencies at the ports. During this period, it was required that every individual entering Nigerian Ports use identity cards. Also at the ports, there were establishment of Magistrate Courts to prosecute violators of Port rules and regulations. These

measures helped increase import duty collected by about 41.03 percent, recording N55 billion in 1996 compared to N39 billion in 1995.

All efforts made to address issue of delay and fast-track clearance of goods within 48 hours has been unsuccessful. This led to the introduction of 24 hours round the clock service at the Ports, while computerised the operations of the Nigerian Customs Service together with documentation procedures with effect from 1998.Also, the introduction of valuation data based within the Customs was to properly assess import duties. This was aided with the use of Automatic System for Customs Data Entry (ASYCUDA).

ASYCUDA was developed by UNCTAD. It facilitates trade at a global level and encourages developing countries to participate effectively in trade facilitation initiatives. It aims at fast-tracking customs clearance with computerised system introduced, simplifying the procedures and therefore reducing administrative costs to the business community (Wilson, 2003; Bagai *et al.,* 2004). Specifically in Africa, there were issues with initial versions of ASYCUDA. This was related to its limited functionality compared to latest versions such as 'ASYCUDA++'.

To facilitate efficient operations at the Nigerian ports, there were installation of X-ray Scanning Inspection System at Apapa and Tin Call Island Ports. This was provided in addition to that of Calabar, Port-Harcourt and Warri Ports, installed since 1999. More so, quick operation is aided at the Ports through the use of scanning system. This allows security verification to be done at a spot by different security agencies. With this development, the requirement for physical inspection of imports has reducedsignificantly. Thus, effective take-off and efficient operation of ASYCUDA is expected to replace pre-shipment inspection.

2.5.3 The Presidential Enabling Business Environment Council (PEBEC)

Towards improving the administrative bottlenecks associated with doing business, the Presidential Enabling Business Environment Council (PEBEC) came into operation in July 2016. PEBEC was set up towards reducing the number of agencies in Nigerian ports, facilitate entry and exit of people and goods, simplify procurement processes of Federal Government, and improve transparency.These could be achieved through articulationof clear service level agreements (SLAs) for permits, documents and

licences (Ministry of Budget and National Planning, 2017).Collateral Registry Bill and Credit Services Bureau Bill,which arethe two key Executive Bills of PEBEC,were passed into law so as to ensure credit accessibility formicro, small and medium enterprises(MSMEs).

Towards end of 2016, the operational arm of PEBEC - the Enabling Business Environment Secretariat (EBES) agency - became functional with a delivery period of 2 years to implement the reforms of PEBEC.

2.5.4 Multilateral and RegionalAgreements

In December 1994, Nigeria ratified the WTO Agreement and became a founding member in January 1995. The concern was about the growing consensus, especially among developed countries, for another round of negotiations to commence in year 2000. Unlike the General Agreement on Tariffs and Trade (GATT), the WTO Agreements were accepted by members as a single undertaking with full understanding of the gamut of provisions related to their rights and obligations. This made it necessary to develop an appropriate institutional and regulatory capacity for implementation.

Nigeria's efforts were favoured in terms of ensuring full understanding and implementation of Uruguay Round Agreements before new negotiations. In the immediate, Nigeria required technical assistance from the WTO and the developed countries to work on realigning its domestic regulations with the various requirements of the WTO Agreements, develop human capacity and strengthen relevant institutions. All thesewere considered necessary for successful implementation of the Agreements.

As part of multilateral agreements, provisions on Trade Facilitation (TF) are also contained in the GATT. The Kyoto Convention of the World Customs Organisation (WCO) was one of the agreements adopted on Trade Facilitation apart from GATT. Against this background,focus has shifted from constant tariffs reduction as a result of GATT, to non-tariff barriers and trade facilitation. This occurs with the growing emergence of global value chains that highlight the significance of an efficient trade administration(OECD/WTO, 2015). In a narrow sense, trade facilitation is the application of efficient trade procedures through which all the activities requiredfor quick movement and delivery of goods in international trade are simplified and

harmonized (WTO, 1998). In a wider sense, however, TFcomprises all measures that allow quick movement of goods between sellers and buyers, along the international supply chain. Based on this, Woo and Wilson (2000) defined TF as improving efficiency in the administrative procedures, customs points, and ports logistics.

TF as one of the Singapore issues came into being in 1996. It was incorporated in the WTO negotiations of the Doha-Development-Agenda (DDA) in 2001.At the WTO, negotiations on trade facilitation was initiated in 2004 with the sole aim of concluding a multilateral agreement that would help ensure smooth and unrestricted movement of goods and services trade among WTO members (Institute of Economic Affairs, 2006).

AtBali Ministerial Conference in December 2013, negotiations on a Trade Facilitation Agreement (TFA) as part of wider "Bali Package" were concluded by member countries. The TFA contains provisions for quick movement, release and clearance of goods, as well as goods in transit. Also, measures were set out for effective teamwork between customs and other regulatory bodies on trade facilitation and issues relating to customs compliance.Furthermore, the provisions contained both capacity building and technical assistance (Institute of Economic Affairs, 2006).

TFA being the first Agreement concluded by all WTO members consist of three sections (Lakatos, 2016):

Section I contains the provisions on Trade Facilitation which each member state must comply with. Such provisions includequick movement, release and clearance of goods, as well as goods in transit. Also, provisions for customs cooperation were set out. Under this section, twelve articles are involved with three broader classifications which described in detail Trade Facilitation measures. The first classification relates to measures essentially concerned with transparency issues. The second classification addresses charges, fees and formalities for export, import and transitwhile the third classification focuses on customs cooperation.

Section II encompasses provisions for special and differential treatment (SDT). In this section, members from developing and Least Developed Countries (LDC) are allowed to determine the implementation periods. Identify those provisions that may be

difficult for them to implement despite the receipt of technical assistance and support for capacity building.

Section III comprises establishment of a permanent committee on trade facilitation at the WTO. Also, member countries are required to set up a national committee to facilitate domestic coordination and implementation of the Agreement and bring together governments and private sector.

The implementation of TFA in Nigeria has tendency to reduce costs of trading, improve competitiveness and integrate the country into the global value chain. Therefore, to reap the benefits associated with TFA,Nigeria connected both its domestic trade facilitation programmes together with cross border trade facilitation strategies (OECD-WTO/OMC, 2017). Geographically, since Nigeria is surrounded by land borders, the national trade policy increasingly gives support towards an all-inclusive approach to strengthening institutional frameworks and enhancing trade. Subsequently, National Committee on Trade Facilitation (NCTF), previously recognized as Task Force on Trade Facilitation was established.This aimedat identifying common barriers to Trade Facilitation (TF), provide solutions to the obstacles, and coordinate successful implementation of TF in Nigeria (OECD-WTO/OMC, 2017).Nigeria as a member of WTO domestically ratified the TFA on 16th January, 2017, made it 107th country to sign up to the agreement and this is a reflection of its commitment to the WTO and a rules-based economy.

Also, Nigeria is a founding member of ECOWAS. Under the ECOWAS Trade Liberalisation Scheme (ETLS), there exists about 525 companies and 1192 products. Nigeria out of this total accounted for about 50 percent and 33.1 percent, respectively (Bankole, Olasehinde& Raheem, 2012; WTO, 2017). The ETLS came into operation in January 1990,while re-affirmed in 1993 as part of the ECOWAS Revised Treaty. It is a mechanism for executing the Customs Union (CU) among member states. It guidestransit operations as well as movement of goods and people across the region (West Africa Trade Hub Technical Reports, 2010). An additional effort of the scheme was the establishmentof Common External Tariff (CET),with the aim of removing customs duties, non-tariff barriers and as well protectdomestically produced goods by member countries. Generally, the adoption and implementation of the scheme was

geared towards facilitating the development of private sector and global trade competitiveness.

Lengthy procedures coupled with quantitative restrictions on imports, non-tariff barriers and other related costs incurred at the borders give rise to informal trading activities. Thus, Nigerian government put in place some measures which are expected to significantly reduce smuggling activity and simplify cross-border trade (Ukaoha & Ukpe (2013). Besides, the Ministry of Trade in the 90s made attempt to establish regional and transnational border markets across the country. This aimed at simplifying trade procedures and provide adequate trade-related infrastructure that would permit coming together of traders from Nigeria and neighbouring countrie tocarry out business basically under the ETLS. Establishment of such markets was perceived as a possible solution to reduce smuggling activities, increase government revenueand security along the border.

Specifically, ETLS is designed to boostdomestic manufacturing outfits in order to compete favourably with imported products in the sub-region's market and to eliminate tariff and non-tariff barriers (NTBs) between the member coubtries (CBN, 2006). Groups of products contained in the ETLS scheme include unprocessed goods (not gone through any industrial transformation), traditional handicraft products (directly activated by the craftman), and industrial products (both processed and semi-processed).

For effective implementation of the ETLS, certain opportunities that are expected to be realized by ECOWAS member include: creation of larger markets for goods coming from member countries, encourage domestically produced goods to compete favourably with cheap imported ones, encourage entrepreneurial development, and greater potentials toward reducing unemployment rate in member countries.

2.5.5 Bilateral Trade Arrangements (BTAs)

Building on the existing relationhips between countries and securing a favourable market access conditions, particularly for products that are of interest to the trading partners, a bilateral trade agreementswas signed between Nigeria and some countries in the world. These agreements promote and protect Nigeria's trade and investment interests in other countries and foreign trade and investment in the country. Some of

these agreements are non-reciprocal preferential trade agreements while, some also include elements of investment (WTO, 2011; 2017). In recent years, Nigeria has bilateral investment agreements with 31 countries, 15 of which are in force[17]. Also, it has double taxation treaties with 13 countries, and is a signatory to 21 investment-related instruments, and nine memorandum of understanding agreements[18]. Bilateral trade relations that exist between Nigeria and some of its trading partners,especially those functional are discussed as thus;

2.5.5.1 BTAs between Nigeria and US

According to WTO (2017), Nigeria had signed 16 bilateral trade agreements (BTAs), nine memoranda of understanding (MoU) agreements with the United States. Also, in 2000, a bilateral trade and investment framework agreement (TIFA) was signed between the two countries. This agreement provides both strategic frameworks and principles for dialogue on improving and enhancing trade and investment opportunities between the two countries.In March 2014, the eight Nigeria- U.S TIFA council meeting was heldand Nigeria was represented by the Federal Ministry of Industry, Trade and Investments (FMITI).

Nigeria has also been involved in the African Growth and Opportunity Act (AGOA), which was an Act established by the US in May 2000 to provide duty-free and quota-free market preferences for about 6,400 products from Sub-Saharan African countries to US markets until 2015. Nigeria's leading AGOA non-oil products to the US include shea butter, shrimps, cashew nuts, ginger, local foods, cocoa products and gum Arabic. However, Nigeria has not benefited much from AGOA as the country's products are economically uncompetitive in the US markets. Nigeria's chances of benefiting from this initiative has been unfavourably affected by the difficulties and cumbersome procedures involved in registering a company in the country.

[17] Those that are in force include: Nigeria-United Kingdom BIT (1990), France-Nigeria BIT (1990), Netherlands-Nigeria BIT (1992), Nigeria-Taiwan Province of China BIT (1994), Nigeria-Romania BIT (1998), Korea, Republic of-Nigeria BIT (1998), Nigeria-South Africa BIT (2000), Italy-Nigeria BIT (2000), Germany-Nigeria BIT (2000), Nigeria-Switzerland BIT (2000), Egypt-Nigeria BIT (2000), China-Nigeria BIT (2001), Nigeria-Spain BIT (2002), Nigeria-Sweden BIT (2002), Algeria-Nigeria BIT (2002), Nigeria-Serbia BIT (2002), and Finland-Nigeria BIT (2005).

[18] https://uk.practicallaw.thomsonreuters.com/w-016-4262?transitionType=Default&contentData=(sc.Default)&firstPage=true

2.5.5.2 BTAs between Nigeria and India

A bilareal trade agreement was signed between the Governments of Nigeria and India in 1983. This agreement was an updated draft of the trade and economic cooperation between the two sideswith an attempt to further strengthen private sector collaboration. Also, a trade facilitation measures which is still under discussion was agreed upon to boost bilateral trade relations between both sides.

In 2017, a Joint Trade Committee (JTC) was established between Nigeria and India at the level of Commerce. The Permanent Secretary (Trade) from Nigerian side and Secretary from Indian side met to review the ongoing bilateral trade and commercial relations. The Nigerian delegation led by Director of Trade, Industry and Investment participated in the first JTC meeting which took place in New Delhi, December 2019. The meeting was to further strengthen the bilateral trade link agreement between both sides.

2.5.5.3 BTAs between Nigeria and China

Nigeria and China have signed a number of agreements on trade, economic and technical cooperation, scientific and technological cooperation, in addition to an agreement on investment protection. Towards strengthening these agreements, a joint economic and trade commission was set up by the two countries. In 1971, for instance, the Joint Communiqué on the Establishment of Diplomatic Relations was signed between the Governments of Nigeria and China. In 2001, the two trading partners also signed a bilateral trade and investment promotion and protection agreement, making bilateral trade between them grown significantly. In 2002, an agreement for the Avoidance of Double Taxation and the Prevention of Fiscal Evasion with respect to Taxes on Income was signed by the two governments.

2.6 Theoretical Literature Review

Trade literature could be classified into traditional, new and new-new trade theories. Traditional trade theories are those models that explain why trade emerge between dissimilar countries (inter-industry trade), which could either be based on differences in productivity (Ricardo, 1817), endowment in factors of production (Heckscher, 1949; Ohlin, 1934), or specific factors model. New trade models, on the other hand, focus on

trade between similar countries (intra-industry trade). The former trade models failed to bring trade costs explicitly into their analysis while the latter trade models did so. Generally, issue of trade costs could be associated with new trade models though its foundation was laid down by Samuelson (1952) when he introduced the concept of *iceberg* transport costs.[19]After a while, more and most recent trade models were formulated which all address the issue of trade costs explicitly in their analysis and they include: the new trade theory by Krugman(1979; 1980) and new-new trade model by Melitz(2003).

2.6.1 Classical Trade Theory

Adam Smith and David Ricardo are the fore runner of the classical trade theory. It is based on the labour cost theory of value. According to the theory, goods are exchanged against one another according to the relative amounts of labour embodied in them. Goods that have equal prices embody equal amounts of labour. Classified under the classical trade theory is the absolute advantage propounded by Adam Smith. Also, a well-known model emerged from classical trade theory is popularly called Ricardian model.

2.6.1.1 The Ricardian Model

This model was put forward by David Ricardo (1817), who demonstrated that trade arises not from differences in absolute advantage as postulated by Adam Smith (1776), but from differences in comparative advantage. Thus, in the context of two countries and two commodities, trade would still take place even if one country is more efficient in the production of both commodities (provided that the degree of its superiority over the other country is not identical for both commodities). According to the model, specialization and free trade will benefit all trading partners, even those that may be less efficient producers(Dunn & Mutti, 2004). International specialization is governed by the principle of comparative cost advantage as country will specialize in the production of those commodities in which it has comparative advantage. Ricardo generally assumed the existence of two countries, two commodities and one factor of production, labour. He also assumed that labour was fully employed and

[19] Samuelson's *iceberg* transport cost simply implies non-arrival of a fraction of manufactured products at the destination when shipping them between the regions. The fraction that does not arrive represents the costs of production.

internationally immobile and that product and factor prices were perfectly competitive. There were no transport costs or any other impediments to trade.

The drawback of Ricardian model has to do with the assumption of zero transport costs in determining comparative advantage in trade. This is highly unrealistic because transport costs significantlydetermine the pattern of world trade. Also, it is an independent factor of production. For instance, high transport costs may nullify the comparative advantage and the gain from international trade (Kurmanalieva, 2006). Another weakness of the model is that it assumes perfect and free world trade. But, in reality, world trade is not free. Every country applies restrictions on free movement of goods to and from other countries. Thus tariffs and other trade restrictions affect world imports and exports. These measures therefore not only serve as hindrances to trade but also they inhibittrade performance among countries and do not promote economic growth.

2.6.2 Neo-Classical Trade Theory

The neo-classical theory of trade evolved around attempt to modify some unsatisfactory aspects of the classical trade theory. The neo-classical, however, advanced a more realistic explanation for the existence of comparative cost differences between countries; introduced capital as a second factor of production; and allowed for international differences in the pattern of demand.Under this trade theory, two major models emergednamely;Heckscher-Ohlin(H-O) model and specificfactors (SF) model with their extensions.

2.6.2.1 The Heckscher-Ohlin Model (H-O)

This trade model was propounded by Hecksher (1919), elaborated by Ohlin (1933) and vigorously analyzed and applied by Paul Samuelson in 1948, 1949, 1953 and 1962. Thus, the model came to be known as Heckscher-Ohlin-Samuelson (H-O-S) trade model (Dunn & Mutti, 2004). According to this model, the main determinant of pattern of production, specialisation and trade among regions is the relative availability of factor endowments and factor prices. The theory posits that different regions/countries have different factor endowments and factor prices, that some countries have comparatively large supply of capital whereas in others the supply of labour may

berelatively large. Because of difference in factor endowments, there could be difference in the prices of the factors. Owing to difference in the prices of the factors, there could be difference in the cost of the goods. Hence, Heckscher-Ohlin-Samuelson (H-O-S) theory states that the main cause of difference in comparative costs is the difference in factor endowment. Thus international trade takes place because of diversity in factor endowments and difference in prices. As a result, each country will export that commodity in the production of which such factor is used whose supply is relatively abundant and price is relatively cheap. On the other hand, it will import that commodity in the production whereof that factor is used whose supply is relatively scarce and price is relatively dear. According to this model, conditions of supply alone determine the pattern of international trade. Fundamentally, H-O model assumes the existence of two countries, two commodities, and two factors of production (or the 2 x 2 x 2 trade model).

Other assumptions upon which the (H-O) model is built are: Identical homothetic tastes (homogenous goods), production with constant returns to scale and identical technologies, perfect competition in the goods and factor markets, costless international exchange of commodities, free and unrestricted trade between or among countries, factors of production that are completely immobile across international borders but that can move costlessly among industries within a country, equal numbers of goods and factors, and sufficient similarities in factor endowments to place all countries in the same cone of diversification.

The shortcomings of (H-O) modelare similar to that of Ricardian trade model because the model also ignores the component of trade cost, especially on the assumption of costless international exchange of commodities, which in reality, does not hold. Moreover, the model does not capture trade restrictive measures such as tariff, import duties, which can as well inhibit trade relations between and among trading countries.

Scholars such as Bergstrand (1985), Deardorff (1998) and Romalis (2004) have modified and applied the H-O model. For instance, Romalis (2004) introduces iceberg transport costs to determine the commodity structure of production and trade by generating a departure from factor price equalization.

2.6.2.2 The Specific Factors Model (SF)

The specific factors (SF) model was originally discussed by Jacob Viner (1931). The model is a variant of the Ricardian model. It was further developed by Jones (1971) and Samuelson (1971) and hasbeen interpreted by Mayer (1974), Mussa (1974), and Neary (1978), as an alternative to the H-O model (Suranovic, 2004).Hence the model is sometimes referred to as Ricardo-Viner model. In this model, there is a distinguishing feature that one factor input is assumed to be "specific" to a particular industry.A *specific* factor is one which is stuck in an industry or is immobile between industries in response to changes in market conditions (Dunn & Mutti, 2004; Suranovic, 2004). A factor may be immobile between industries for a number of reasons. Some factors may be specifically designed (in the case of capital) or specifically trained (in the case of labour) for use in a particular production process. In these cases it may be impossible, or at least difficult or costly, to move such factors across industries. The SF model is designed to demonstrate the effects of trade in an economy in which one factor of production is specific to an industry. The most interesting results pertain to the changes in the distribution of income that would arise as a country moves to free trade.

The basic assumptions of the model include: two sectors (agriculture and manufacture), three factors of production: labour (L), capital (K) and land (T), technology (constant returns to scale) production functions, that perfect competition prevails in all markets, and that the two countries differ only in their factor endowments (same tastes, same technology).

The shortcomings of SF modelare related to that of H-Omodel because the model also disregards the component of trade costs, especially the assumption of costless international exchange of commodities which in reality does not hold. Furthermore, the model does not capture trade restrictive measures such as tariff, import duties, which can as well inhibit trade relations between and among trading countries.

Sadikov (2007) has modified and applied the specific factor model. He introduces specific factor input as country’s endowmwnt require to produce manufacturing varieties.

2.6.3 A Simple "Iceberg" Partial Equilibrium Model

Samuelson (1952) developed iceberg model as a device to analyze the effect of trade costs. The concept otherwise known as *iceberg* transport costs was initially designed to model transportation costs. The model assumes that long distance attracts high cost of transporting goods, and vice versa, and that neighboring countries can easily trade with each other even with much lower transportation cost. According to this model, inefficient trade procedures tend to increase trade costs and drive a wedge between the price received by the producer of the good and the price paid by the consumer. This according to the model, represents a pure loss (deadweight loss) similar to part of the iceberg's mass that is melted away as it moves through the ocean. In the iceberg model, trade costs are proportional to the value of goods shipped, but the main results will continue to hold even in a case where trade costs are additive.

The model has been criticized on the following grounds: first, iceberg exponential function is concave rather than convex with distance. This is not supported by empirical facts. Second, the model places much emphasis on transport as an element of trade costs without giving any consideration to either fixed costs (sunk costs) or variable costs (such as tariffs) of entering export markets.

Kurmanalieva (2006) has applied Samuelson iceberg partial equilibrium model. He uses transport density to proxy transport costs in modelling the effects of transportation costs on volumes of trade.

2.6.4 The New Trade Theory (Monopolistic Competition)

Failure of the classical trade theories to consider some assumptions which have comparatively more relevance in today's complex trade issues initiated the arguments of the new trade theory (NTT). The new trade theory was developed by Krugman (1979, 1980) to explain why countries engage in intra-industry trade. The theory emphasizes that a great bulk of global tradeis intra-industry rather than inter-industry. Krugman therefore based his theory on certain assumptions so as to explain the feature of global trade.For instance, he assumes that consumers prefer variety in consumption (love of variety), that firms populated the market with differentiated varieties of a goods and that there are increasing returns to scale in production(i.e., reduction in average cost of production of a firm resulting from increased production).

The theory predicts that trade costs can have a disproportionately adverse impact on small developing economies. Naturally, small developing countries have large agricultural or natural resource sectors characterized by constant returns to scale, and only a small manufacturing sector. In contrast, big developed countries have a large manufacturing sector operating under increasing returns to scale. In this setting, trade costs lead both to less trade and to a disproportionate relocation of manufacturing to the big developed countries (the "home market effect"). Meanwhile, small developing countries become concentrated in the agricultural or natural resource sector (World Trade Report, 2015).

The basic explanation to this result lies in the tension created between the consumer's love of variety and increasing returns to scale. With open trade and zero trade costs, consumers in the big developed country will buy both foreign and domestic manufactured goods because of their preference for variety. Ceteris paribus, love of variety brings about more trade. On the other hand, increasing returns to scale gives a cost advantage to manufacturing firms in the developed country because of the size of the market and the larger scale of production that could be achieved by firms in big developed countries. All things being equal, consumers in the developed country will prefer to buy lower-cost domestic varieties than higher-cost foreign varieties (World Trade Report, 2015).

Generally, inefficient trade procedures that lead to higher trade costs upset this balance by making purchases (imports) of foreign varieties more costly while consumers in the developed country will move away from foreign varieties towards domestic varieties. This shift in demand towards domestic manufactured goods gives greater scope for what are already powerful scale forces to operate. The manufacturing sector in the big developed country expands even more while it shrinks in the small developing country. This analysis suggests that small developing countries that want to diversify their economies have a strong interest in lowering trade costs, as this reduces incentives for manufacturing to concentrate in the biggest markets (World Trade Report, 2015).

The major shortcoming of the new trade theory (NTT) is that its relevance is limited to trade in manufactured goods. Also, the theory considered industry rather than firm as a

unit of analysis. This made it difficult to explain asymmetries issue across firms in terms of -productivity, size and export market.

Neary (2004), Feenstra (2010), Shahbaz*et al.* (2012) are some of the scholars that have either modified or applied Krugman's new trade theory of monopolistic competition.

2.6.5 Heterogeneous Firms' Trade Theory (Melitz Model)

Melitz model was propounded to deal with the inadequacies of the new trade theory, particularly on asymmetriesissues across firms in terms of productivity, export and size. This made it unclear whether all firms within an industry export, or are exporting firms a random sample of the population of firms in an industry. This model was built on the work of Hopenhayn (1992), who studied both the entry and exit dynamics of firms in an industry. The model is able to reproduce many of the most salient patterns emphasized by recent micro-level studies related to trade. The model also shows how the exposure to trade encourages only the more productive firms to export while at the same time forcing the least productive firms to exit the industry. Both the exit of the least productive firms and the additional export sales gained by the most productive firms reallocate market shares towards the most productive firms and contribute to an aggregate productivity increase. Profits are also reallocated towards more productive firms. Generally, Melitz model is consistent with the widely reported stories in the business press describing how the exposure to trade enhances the growth opportunities of some firms while at the same time contributing to the downfall or "downsizing" of other firms in the same industry.

HFTT shows that the unit of trade analysis has shifted over time from industry to firm level. It incorporated firms' patterns across industries with respect to productivity (Ciuriak *et al.,* 2011). Originally, Melitz in his model considered a world of symmetric countries with one factor (labour) and one industry. He later assumed further that the model can easily be extended to asymmetric countries by relying on an exogenously fixed relative wage between countries.In each country, there is a continuum of differentiated firms with different varieties of goods and their productivity. Potential entrants are doubtful of their future productivity in the industry any time costly investment decision to enter domestic market is taken. As a result, firms produce at different productivity levels. Apart from the entry costs (sunk costs), firms faced with

fixed costs of production and thus increasing returns to scale of production. Increase in production costs result to exit of inefficient firms whose productivity is lower than the threshold level because they would not be able to break-even. On the demand side, the agents are assumed to have Dixit-Sliglitz preference over continuum of varieties of goods. As every firm is monopolistic in nature setting product prices will be at a constant mark-up over its marginal cost in order to remain in business (Zhai, 2008).

In an extension to Melitz-type model with firm heterogeneity, Chaney (2008) considered a world with many asymmetric countries, separated by asymmetric barriers to trade. He also added firm heterogeneity in productivity, as well as fixed costs of exporting into the model. The amendments made by Chaney (2008) therefore introduced a new margin of adjustment, which is extensive margin. According to him, trade costs can be categorized into fixed and variable costs. Variable trade costs are costs that have to be incurred on every unit of export. Tariffs are a prominent example of variable trade costs, as exporters need to pay duty on every unit imported. Fixed trade costs are costs that have to be incurred independently of the volume of exports. A firm deciding on whether to enter a particular market might have to incur certain costs to learn about the trade procedures in that country. These are costs incurred even before it ships a single product to the foreign market (World Trade Report, 2015). It is further argued that firms vary by productivity and that net returns on export activities vary by destination countries. Therefore, a rational firm will engage in export markets with high demand, low fixed and variable costs for it to maximize profit.

Chaney (2008), in his analysis defined the intensive margin as the number of exports and the associated exporters while extensive margin is described as the variety of exports against the associated firms. In a given export market, a reduction in variable costs will affect the intensive margin (i.e., the volumes of trade) as well as the extensive margin (i.e., diversification of trade) positively. This phenomenon will enable existing exporters to export more and thus increase the number of exporters following a reduction in the threshold productivity required to enter the export market. On the other hand, when a fixed cost is reduced, there will not be a significant effect on the intensive margin (volumes of trade) as the existing exporters would have already paid the cost. Instead, the reduction will encourage new firms to enter the export market which will eventually have a positive effect on the extensive margin

(diversification to trade). Chaney further analysed why elasticity of substitution has opposite effects on the extensive and intensive margins of trade. He added that a higher elasticity of substitution for homogenous goods make the intensive margin more sensitive to changes in trade barriers, but less sensitive for extensive margin. The reason is that when trade barriers decrease, new and less productive firms enter export market. When the elasticity of substitution is high, a low productivity is a severe disadvantage. These less productive firms can capture only a small market share.The impact of those new entrants on aggregate trade is small. On the other hand, when the elasticity of substitution is low, each firm is sheltered from competition. The new entrants capture a large market share. The impact of those new entrants on aggregate trade is large. So a higher elasticity of substitution magnifies the sensitivity of the intensive margin to changes in trade barriers, whereas it dampens the sensitivity of the extensive margin. The theoretical prediction from the above analysis therefore is that transaction costs would produce higher effects on extensive margin for differentiated goods than it would be for homogenous goods.

The major shortcoming of Melitz model is that it is only suitable for firm level analysis and not country based analysis.The model also failed to take the cognisance of costs that inhibit trade at domestic level (such as border-related costs) but rather focused on those costs at international level (i.e., both fixed and variable trade costs associated to tariffs and transportation cost).Based on this, the model failed to recognise the fact that trade costs is not only constituted by international trade costs but also domestic trade costs.

Scholars such as Helpman*et al.* (2004), Falvey*et al.* (2006), Melitz and Ottaviano (2008), Hanson and Xiang (2008), Helpman*et al.* (2008), Ahn, Khandelwal and Wei (2010), Arkolakis (2010), Eaton*et al.* (2011), Schroder and Sorensen (2012) have subjected Melitz model to applications and modifications. For instance, Ahn, Khandelwal and Wei (2010) introduces intermediation technology as an approach through which participation level of small firms in export markets can be facilitated.

2.6.6 Concluding Remarks on the Reviewed Theories

Several theoretical models on the relationship between trade costs and trade flows have been reviewed between sections 2.6.1 and 2.6.5. Each of these theories explained different channels through which trade costs could impede trade. Based on the assumptions of each, it is clearly revealed that traditional trade models fails to bring trade costs explicitly into their analysis while the new trade models do. However, Samuelson (1952) in his simple iceberg partial equilibrium model placed emphasis on iceberg transport costs without consideration to other sub-components of trade costs such as tariffs. Also,the neo-classical trade theory assumed that firms are homogeneous. But to capture the heterogeneity of firms in terms of productivity, export and size, heterogeneous firm trade model emerged. This is contrary to the new trade theory (NTT) by Krugman (1979, 1980) that used industry as a unit of analysis rather than firm in which case, the theory found it difficult to explain asymmetries issues across firms. Melitz (2003) in his heterogeneous firm trade model used firm as the unit of analysis. The issue of trade costs is explicitly analysed showing that firms apart from facing fixed production costs, they are also required to incur initial entry costs i.e. sunk costs and variable trade costs in addition. However, the theory is mostly suitable for analysing firm-level exports.Since the present study is based on country-level analysis using aggregate trade data, the standard H-O model is modified and adopted to account for trade costs.

2.7 Methodological Literature Review

This section is classified into two sub-sections: the first sub-section reviews various trade costsmeasures, while the second sub-section basically deals with review of methods of analysis.

2.7.1 Review of Measures of Trade Costs

In reality, measuring the actual costs involved in trade between countries has been very difficult. This is because quantifying the components of trade costsis difficult as the scope for direct measurement and international comparison is limited. Also,due to unavailability of broad data on trade policy measures, especially non-tariff barriers, across countries and time. Based on this, trade costs could be measured using direct approach and indirect approach (Anderson & van Wincoop, 2004).

2.7.1.1 Direct Measurements of Trade Costs

Direct measurements of trade costs is based on observable data directly collected or proxy variables on various sub-components of costs. These sub-components can be grouped as follows: Trade policy barriers measures, trade related infrastructure measures, border-related measures and costs related to institutional issues.

2.7.1.1.1 Trade Policy Barriers Measures

This measures the extent to which individual country has developed policies that prevent goods moving freely from one country to another, or making imported goods or services less competitive than domestically produced ones. Specifically, the indicators of trade policy barriers include costs arising from tariffs, non-tariffs and exchange rate. These are measures in which exporting countries do not have any control over them. Trade policy barriers measure has two components: traditional and non-traditional. The traditional measures comprise tariffs (ad-valorem and specific), quotas, andtariff-rate quotas (TRQ) which is combination of both. On the other hand, non-traditional measures encompass antidumping duties, countervailing duties, and safeguard measures. Given the fact that trade policy measures are numerous and of various forms, therefore, computing a single measure of trade restrictiveness become problematic. Although, computing these measures using tariff equivalent approach could be convenientto aggregate a large number of tariffs and non-tariff measures into a single figure (Portugal-Perez & Wilson, 2008).

Contributing to address these issues, Kee*et al.*(2008) following Anderson and Neary (1994), developed two theoretically grounded indexes: Overall Trade Restrictiveness Index (OTRI) and Tariff Trade Restrictiveness Index (TTRI). The former captures all policies for which information is reported by WTO, UNCTAD and international trade centre (ITC). In its computation, both tariffs (ad valorem tariffs, specific duties) and non-tariff measures (price control measures, quantitative restrictions, monopolistic measures, and technical regulations) were considered. On the other hand, the latter considers only specific and ad-valorem tariffs in its computation.

In using trade policy barriers measure of trade costs, studies such as: Baier and Bergstrand (2001), De (2007), Portugal-Perez and Wilson (2008), Brooks and Ferrarini (2010), Jacks*et al.* (2010), Miroudot*et al.*(2012, 2013), Jalerajabi and Moghaddasi (2014) among others used the tariff measures together with other non-border related

measures. While Hoekman and Nicita (2011) measures trade costs using both tariffs and non-tariff measures with other trade costs indicators. However, in the study by Singh *et al.* (2015), they considered the three (3) costs arise from border related costs (i.e., tariffs, non-tariffs and exchange rate). In some other studies, trade costs are measured using tariffs and exchange rate together with other measures. Such studies include: Khan and Kalirajan (2011) and Arvis *et al.* (2013). Both sourced data on tariff from TRAINS database. The former used data onnominal exchange rate (US$ per unit of foreign currency) sourced from International Financial Statistics Yearbook (2006) to compute real exchange rate.

2.7.1.1.2 Trade-related Infrastructure Measures

These measure the infrastructural availability and adequacy of a country. It covers a variety of themes to include: transportation (transport infrastructure and transport services, maritime transport connectivity, shipping costs), telephone, internet, electric power, water, waste disposal and security together with availability of secure, reasonably priced storage and warehousing facilities at ports. Trade-related infrastructure measures allows for the existence of links between countries, as well as the mechanism that explains the intensity of transport or trade flows along those links.

Inefficiency of infrastructure in any of the form highlighted earlier raises trade costs and consequently inhibit trade flows. Limao and Venables (2001), for instance, measured trade costs using quality of transport and communications infrastructure based on the index constructed by Canning (1998).Also, carriage, insurance and freight (cif)/free on board (fob) ratio was used to proxy transport costs. However, Hummels and Lugovskyy (2006) criticised that the use of cif/fob ratio as a proxy for transport costs is unreliable. In their arguments, cif/fob ratio tends to vary across time and nature of commodity, unlike distance.

Busse (2003) measured trade costs using communications infrastructure and transport costs. The author used Internet hosts per capita, number of telephone mainlines and fax machines as indicators of communications infrastructure. Data on transport and communications costs were sourced from Hufbauer (1991), U.S Department of Commerce (2001), and World Bank (2002a).In another dimension, Nordas and Piermartini (2004) constructed an index for each type of infrastructure. Data on

infrastructure density were exracted from WDI, while from Global Competitveness Report for port efficiency. Brooks (2008) measured trade costs using hard (physical projects) and soft (institutional) or infrastructure development and services across the Asian developing countries. He sourced data from Shipping Statistics Yearbook and Containerisation International Yearbooks.

Korinek and Sourdin (2009) measured trade costs using maritime transport costs proxied by shipping costs (i.e., cost per tonne of transported merchandise, cost per tonne-nautical mile of transported merchandise, cost of hauling a container on selected major shipping routes and cost of hauling a container one mile on selected major shipping routes). The authors used the newly compiled OECD maritime transport costs database covering about four million data points for products at the HS-6 digit level for 42 importing countries from all 218 countries of the world from 1991 to 2007.

Abe and Wilson (2009) measured trade costs using transport costs proxied by ports efficiency, port infrastructure quality, port congestion, and water transport.The data used were sourced from WDI, IMF- Direction of Trade Statistics (DOT). In a related study,Behar and Venables (2011) measured trade costs using transport costs proxied by the stock of infrastructure index. The authors considered four infrastructural indicators: length of road, length of paved road, length of rail and telephone main lines per person as initiated by Canning (1998).

Using trade related infrastructure measures,several other studies (Greenaway*et al.,* 2009; Jacks*et al.,* 2010; Brooks & Ferrarini, 2010) have used quality of infrastructure together with other indicators to measure trade costs. While in some other cases, for instance, Amiti and Javorcik (2008) used only transport infrastructure and Bougheas*et al.* (1999) used only transport costs by assuming that transport costs are inversely dependent on the available level of infrastructure.

2.7.1.1.3 Border-related (or Domestic Regulatory) Measures

The border-related measures reflect the domestic economic environment in the area of legal and regulatory framework, costs of supplying information, providing documentation, administrative red tape, and customs clearance procedures etc. Previously, there was no data on domestic trade costs. However, in recent times, the World Bank initiated the collection of such data with specific focus on performance of

logistics services in each country and internal costs associated with shipping goods (either from the factory gate to the portor from ports to retail outlets).Logistics Performance Index (LPI) was first captured by World Bank in 2007 and followed by doing business database in 2008. In these indicators, the prevailing domestic regulatory measures that affect trade are captured (Hoekman & Nicita, 2011).

2.7.1.1.3.1 The Logistics Performance Index

This measures the performance of a country along the logistics supply chain. The index covers six themes:customs efficiency and border clearance, quality of trade-related infrastructure, the ease of shipments, the quality of logistics services, tracking and tracingof shipments, and timeliness of shipments. Data are collected biennially through a survey conducted on freight forwarders and express carriers. The questionnaire asks both perception-based questions and quantitative questions. Under the perception-based questions, respondents were asked to rate logistics performance of their respective countries on a scale ranging from 1 to 5. However, the quantitative questions were based on what percentage of shipments undergo physical inspection more than once (Arvis *et al.,* 2014). The most recent data set as at the period of this study was for 2016. The data set allowed comparison across 160 countries.

LPI has had significant impact in raising awareness such that it provides information of where a country stands and a broad indication of problem areas. It also pushes for comprehensive "connectivity" and logistics policies. However, the main challenge of LPI is associated to weakest link paradigm. This is when a number of reforms in parallel and in several areas create problem in scores and rank in the middle of the sample. A number of studies have measured trade costs using LPI dataset.For instance, Portugal-Perez and Wilson (2009) used LPI index.Other measures of trade costs considered in their study are OTRI, TTRI and doing business indicators. In a related study, Hoekman and Nicita (2011) used the overall LPI score to proxy trade costs while comparing the effect of border barriers with other sources of trade costs[20].

[20] The study only considered the customs and regulatory environment parts of the index.

2.7.1.1.3.2 The Doing Business *"Trading across Borders Index"*

In the doing business, the time and cost (apart from tariffs) associated with logistics process of exporting and importing are recorded. Also, involved in the logistics process are the three procedures required in the overall shipment processes. The procedures include domestic transport, documentary compliance and border compliance. Together with this, TB indicates the number of document required to complete export/import procedures.

The indicators are built from primary data collected each year from trade experts, such as freight forwarders, logistics companies, shipping lines and customs brokers. The most recent data, published in Doing Business 2016, are for 2014/15 and covered 189 economies (World Bank Group, 2016).

In using this measures of trade costs, Hummels (2001), Nordas*et al.* (2006),Minor and Tsigas (2008), Ueki (2015) among others only used the TBI sub-indicators, specifically, time. For example, Djankov *et al.* (2006) used time taken (both export and import) to measure ease of moving goods from a firm's warehouse to ship, while Brooks and Stone (2010) used only time costs of exports. Bourdet and Persson (2012) used time costs (measured by number of days) required to fulfil border requirements when importing to EU27 countries. Data were sourced from World Bank*doing business database.*

In the study by Behar (2009), trade costs were measured using only documents required. However, the overall TBI comprises of 3 components: required number of documents,time and cost(per container). A number of studies (Iwanow & Kirkpatrick, 2009; Ezzat, 2015; Lawless, 2010) used the overall TBI (i.e.,the three doing business requirements to export and import) as trade costsmeasures.

In another dimension, OECD (2003) measured trade costs using direct costs (costs of supplying information and providing documentation) and indirect costs (costs associated with procedural delays at the border) across 102 OECD countries. While in a study by Freund and Rocha (2010), trade costs were measured by the list of procedures including: customs, documentation, inland transit delays and ports time. Data were extracted from World Bank survey administered to trade facilitators at freight-forwarding companies across 146 countries in 2007.

2.7.1.1.4 Instituttional Quality Measures

Institutional quality measures the channels through which weak or inadequate institutionsimpede trade. Weak institutions are the products of corruption spreading across every point in the supply chain, thus increase trade costs(Portugal-Perez &Wilson, 2008). For this measure,a commonly used approach is survey-based.

Several indicators of institutionalquality have been constructed by private institutions and think tanks, such as World Bank, Transparency International (TI) and Political Risk Services Group (PRSG). These institutional indicators have been employed specifically, to assess the relative risk of carrying out businesses in different countries. Some of the indicators used by these international organisations include rule of law, control of corruption, contract enforcement (Bandyopadhyay*et al.,* 2015). The *Global Competitiveness Report* (GCR) published annually by the World Economic Forum (WEF) since 1979 is one of the indexes constructed to measure the set of institutions across the world. Measuring trade costs through costs related to institutional issues, Anderson and Marcouiller (2002) constructed an index using existence of impartial, contract enforcement and transparent government policies. In doing this, participants' responses in the WEF survey assigned with a score ranging from 1 to 7 were used.

Helble*et al.* (2007) measured trade costs using both objective and perceptions-based indicators to produce composite measures of transparency. The authors considered predictability and simplification as measures of transparency. The former was proxied using data on administrative favouritism, tariff rates, tariff bindings, and uncertainty surrounding import times. However, the latter was proxied using number of agencies an importer must deal with, time to import, the prevalence of trade-related corruption, and extent of trade barriers other than published tariffs.In a study by Abe and Wilson (2008), lower trade costs were measured using transparency improvement and reducing corruption.

Francois and Manchin (2007) measured trade costs using institutional quality with focus on freedom of trade, size of government, business regulation and protection of property rights. The authors constructed the institutional average level (IAL) index using the methodological approach of Helble*et al.* (2007) that measured institutional quality based on predictability and simplification. Similar methodological approach

was adopted in the study by Bugel (2010). He constructed a country specific index to measure institutional average level (IAL) using answers provided to selected questions in the 2008 Global Competitiveness Report. The selected questions comprises: property rights, judicial independence, favouritism in governmentdecisions, burden of customs procedures, and business costs of terrorism among others.

2.7.1.2 Indirect Measurements of Trade Costs

The indirect approach to measuring trade costs aims at quantifying overall trade barriers by infer the extent of trade inhibitions from trade flows without distinguishing between cost sub-components. Under this approach, trade costs relate to the difference between the trade flows that would be expected in a hypothetical "frictionless" world and what is actually observed in the trade data (Anderson, 2011).

The major advantage of such indirect and "global" measurements is that no arbitrary definition of a trade cost function is needed in the calculation. This implies that whatever the theoretical foundation retained for the gravity equation – a micro framework with monopolistic competition as in Anderson and van Wincoop (2003), a Ricardian model of trade (Eaton & Kortum, 2002), a firm heterogeneity model (Chaney, 2008) – Novy (2013), shows that easy computational rearrangements allow to isolate trade costs and express them as an absolute function of observable trade flows (OECD, 2013). Generally, the indirect measures of trade costs being a function of observable bilateral trade data at the industry level, its measurements can be reasonably made available for many more countries, industries and time periods than direct trade cost measures (OECD, 2013).

Measuring trade costs using indirect approach, gravity model has been estimated in different versions to infer bilateral trade costs by adopting the framework of either unconditional or the conditional general equilibrium (Turkson, 2012).Following from Tinbergen's (1962) benchmark gravity model for explaining bilateral trade flows, it was discovered that both the conditional and unconditional equilibrium framework are the two key theoretical approaches arisen from literature. The difference between these approaches was the assumption made about the separation of consumption and production decisions from those decisions made about the choice of bilateral trade countries (Bergstrand & Egger, 2013). The conditional general equilibrium approach

assumed that both the consumption and production decisions are given while each country specializes in the production of its own good. On the other hand, the unconditional general equilibrium approach recognized the absence of separation of consumption from production decisions in making a bilateral trade decisions. The approach makes the roles of technology and market structure more elaborate than the earlier approaches (Bergstrand & Egger, 2013).

Under the conditional general equilibrium framework, trade economists have estimated two types of gravity equations which are; the "theory-based"and "traditional" gravity equations. The traditional gravity equation adopted unobservable trade costs in his approach following Tinbergen (1962) and Anderson (1979) which is stated as follows;

$$x_{ij} = \varphi_1 y_i + \varphi_2 y_j + \sum_{m=1}^{M} \beta_m \ln\left(z_{ij}^m\right) + \varepsilon_{ij} \qquad (2.1)$$

Where $x_{ij}$is the log of exports from exporter i to importer j, $y_i$and $y_j$are the log of GDP of the exporter and importer, z_{ij}^m (m=1,…, M) is a set of observables to which bilateral trade frictions/barriers are related and ε_{ij} is the disturbance term. To derive equation (2.1), the assumption was that prices are equal across producers. This implies symmetry in trade costs. In order to accommodate the presence of asymmetric trade costs, Bergstrand (1985) included prices in equation (2.1), while (Bergstrand & Egger, 2013)found that bilateral trade flows are influenced by price indexes.

Subsequently, following from the findings of McCallum (1995), Anderson and van Wincoop (2003) make a theoretical refinement of equation (2.1) through inclusion of multilateral trade resistance variables[21]. McCallum (1995) considered two variables (i.e., bilateral distance and a dummy variable that is equal to one if the two regions are located in the same country and equal to zero if otherwise) in estimating a version of equation (2.1) for U.S and provinces of Canada. After controlling for distance and size, the authorfinds trade between provinces to be twenty-two times more than trade between states and provinces. This suggests that substantial trade costs were incurred in trade across the U.S-Canada border.

Anderson and van Wincoop (2003) argue that the impact of national borders on bilateral trade by McCallum was found to be highly overstated. This was due to failure of the traditional gravity model to account for the impact of multilateral trade

[21] These are the barriers to trade that each country faces with all its trading partners

resistance (i.e., the average trade resistance between a country and its trading partners with the rest of the world) on bilateral trade costs. Based on this, Anderson and van Wincoop (2003) were encouraged to provide a theoretical refinement of the traditional gravity model (i.e., theory based gravity model) to include multilateral trade resistance variables. The "theory based" gravity model (an improved conditional general equilibrium model) hasbeen estimated in different ways the gravity equation of the form;

$$x_{ij} = \frac{y_i y_j}{y^w}\left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma} \qquad (2.2)$$

Where; $$t_{ij} = \left(Z_{ij}^{m}\right)^{\gamma m} \qquad (2.3)$$

Where $x_{ij}$is nominal exports from country *i* to *j*, $y_i$and $y_j$is the nominal income (GDP) of exporter *i* and importer *j,*respectively, $y^w$is nominal world income (total world GDP), $t_{ij}$is the bilateral trade costs, γ is the elasticity of substitution among goods, $\Pi_i$and $P_j$are outward and inward multilateral resistance variables, respectively. In addition, z_{ij}^{m} (*m*=1,…, M)is a set of observables to which bilateral trade frictions/barriers are related.

Scholars such as Wei (1996), and Evans (2003) have used the "traditional" gravity model to estimate national border costs. In other studies, Trelfer (1993), Lee and Swagel (1997) used it to estimate non-tariff policy barrier costs. In the studies by Rose (2000), Rose and van Wincoop (2001), Alesina*et al.* (2002) and Jacks*et al.*(2008), it wasused to estimate currency barrier costs. Also, Gould (1994), Head and Ries (1998) used it to estimate information barrier costs, while Hoekman and Nicita (2011) used it to compare the effect of border barriers with other sources of trade costs. For theory-based model, scholars such as Head and Ries (2001), Eaton and Kortum (2002), Anderson and Van Wincoop (2003, 2004) made use of the model to estimate trade barrier costs.In a study by Anderson and Marcouiller (2002), it wasused to estimate contract enforcement costs while Shepherd (2009) used it to examine the role of trade facilitation in reducing the overall trade costs.

Following from the criticisms relating to empirical validity of the theoretical assumptions guiding the trade cost function [22] a new strand of trade cost literature has emerged. For instance, studies by Head and Ries (2001), Engel (2002),Head and Mayer (2004) and Novy (2010) allfound that both the traditional and theory-based versions of the gravity model underestimates border barrier costs since non-tradable (domestic trade) sector was not considered. Trade barriers affect both international trade and domestic trade. The intuition behind this argument is that a change in trade barriers brings about a shift in resources between the tradable sector and non-tradable sector (import competing). This results in changes in trade flows either bilaterally or multilaterally. This implies that domestic trade has to be included in the gravity equation so as to account for home bias.

Furthermore, Novy (2010) claimed that the symmetric assumption underlying trade costs within the gravity model might not hold in all cases. This is because a country may impose a higher tariff than the other partner in a trading relation.This could be due to more stringent quality standards and technical requirements. The "missing globalization puzzle" (missing trade flow component when predicted trade flows are compared with actual trade flows) has also called to question the use of standard gravity equations to measure trade costs. Coe *et al.* (2002) and other studies have suggested that explaining "missing trade" could be difficult because of failure to capture all components of trade costs due to lack of information and hidden transactions costs. For insance, the inclusion of time-invariant variable such as distance in a gravity equation implies that estimate of distance elasticity obtained from gravity equation has remained unchanged despite transport costs reduction.

2.7.1.3 A Micro-Founded Measure of Bilateral Trade Costs

Novy (2010) takes a different approach to derive an operational measure of trade costs (known as micro-founded measure of bilateral trade costs). This was built on Anderson and van Wincoop's (2003) theory-based gravity equation, which allows trade costs to be inferred from easily observable time-varying data without imposing trade cost function (with "questionable" assumptions).

[22] Omission of non-tradable sector in the trade cost function, symmetric assumption about inward and outward multilateral resistance, addition of time invariant variables and omission of important frictions to trade.

Novy's approach was to overcome the drawbacks associated with the theory-based gravity framework by Anderson and van Wincoop (2003). The theory-based gravity formulation was a modification of the traditional gravity equation with the inclusion of multilateral trade resistance variables. As shown in equation (2.2), bilateral trade flows depend both on bilateral and multilateral trade barriers of the two countries involved in a trade relation. The shortcoming of this framework is concerned with the assumption of multilateral trade resistance variables made by Anderson and van Wincoop (2003).

According to Anderson and van Wincoop (2003), multilateral trade resistance variables in Equation (2.2), which capture the bilateral countries average international trade barriers with all their trading partners, can be expressed as;

$$\text{Outward} \qquad \Pi_i^{1-\sigma} = \sum_j p_j^{1-\sigma} \theta_j \, t_{ij}^{1-\sigma} \forall_i \qquad (2.4)$$

$$\text{Inward} \qquad \mathrm{p}_j^{1-\sigma} = \sum_i \pi_i^{1-\sigma} \theta_i \, t_{ij}^{1-\sigma} \forall_j \qquad (2.5)$$

Where $\theta_i \; and \; \theta_j$ denotes the income shares of country *i* and *j* in the world income, i.e.,$\theta_i = \frac{y_i}{y^w}$ and $\theta_j = \frac{y_j}{y^w}$, respectively. From Equations (2.4) and (2.5), bilateral trade costs $t_{ij}$are summed over and weighted by all destination countries *j* or origin countries *i*.

To implicitly control for multilateral trade resistance (since direct measures of average trade costs are not readily available) from equations (2.4) and (2.5), Anderson and van Wincoop (2003) assumed a bilateral trade cost function of the form t_{ij}= $b_{ij} d^{p}$.b_{ij}denotes bilateral border indicator between *i* and *j*, whiled_{ij}represents bilateral distance and ρ is the distance elasticity. Also, trade costs between country*i* and *j* were assumed to be symmetric (i.e.,t_{ij}=t_{ij}). This implies symmetry between inward and outward multilateral trade resistance between country*i* and *j* (i.e.,$\Pi_i = P_j$). Concerning the assumptions by Anderson and van Wincoop (2003) on bilateral trade cost formulation, Novy (2010) identified three shortcomings.First, possibility of a functional form misspecification of trade cost function that failed to include key determinants of trade costs such as tariffs and logistics.

Second, in practice trade barriers are not time invariant as assumed. This is as a result of reduction in trade barrier costs as countries phase out tariffs and costs of

transportation. The inclusion of time invariant variables such as common colony, common union, geographic distance, membership of free trade agreements and borders was therefore not useful in capturing empirically time-varying trade costs.

Third, if countries in their trade relationsimpose different tariffs, then it is unbelievable to assume that bilateral trade costs are symmetric. Since a country can impose a higher tariff on imports from a partner country relative to what that partner country imposes, bilateral trade costs are asymmetric (i.e.,$t_{ij} \neq t_{ji}$). Even if tariffs between the two countries are the same, it is unrealistic to assume that other trade frictions would be the same as well. Thus, it follows that inward and outward multilateral trade resistance between country*i* and *j* are not the equal (i.e.,$\Pi_i \neq P_j$) as assumed by Anderson & van Wincoop (2003).

Against these limitations, Novy (2010) derives an explicit analytical solution for multilateral trade resistance variables which solved the trade costs function. This issimilar to Head and Mayer (2004). The argument behind this approach was that changes in trade barriers affect not only international trade but also domestic trade. In practice when a country reduces trade tariffs, some goods that are produced for domestic consumption are shipped to foreign countries, implying that trade barriers impact on domestic trade as well.

Following from equation (2.2), Novy (2010) suggests the expression for domestic (intra-national) trade flows as:

$$x_{ii} = \frac{y_i^2}{y^w}\left(\frac{t_{ii}}{\Pi_i P_i}\right)^{1-\sigma} \tag{2.6}$$

Where $x_{ii}$and $t_{ii}$are domestic (intra-national) trade flows and trade costs, respectively of country *i*. Expressing equation (2.6) in terms of the product of inward and outward multilateral resistance as:

$$\Pi_i P_i = \left(\frac{x_{ii}/y_i}{y_i/y^w}\right)^{\frac{1}{\sigma-1}} t_{ii} \tag{2.7}$$

The general equilibrium model bilateral trade costs could be solved using the explicit solution for multilateral resistance variables. The product of outward multilateral

resistance of one country and inward multilateral resistance of another country were contained in equation (2.2),$\Pi_i P_j$, whereas equation (2.7) provides a solution for$\Pi_i P_i$. Therefore multiplying gravity equation (2.2) by the corresponding gravity equation for trade flows in the opposite direction, (i.e.,$x_{ji}\ x_{ji}$) would be useful to get a bidirectional gravity equation that contains both countries' inward and outward multilateral resistance variables:

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{t_{ij}t_{ji}}{\Pi_i P_i \Pi_j P_j}\right)^{1-\sigma} \tag{2.8}$$

Substituting the solution from equation (2.7) into equation (2.8) gives:

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{t_{ij}t_{ji}}{\left(\frac{x_{ii}/y_i}{y_i/y^w}\right)^{\frac{1}{\sigma-1}} t_{ii} \left(\frac{x_{jj}/y_j}{y_j/y^w}\right)^{\frac{1}{\sigma-1}} t_{jj}}\right)^{1-\sigma}$$

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}} \left(\frac{x_{ii}/y_i}{y_i/y^w}\right)^{\frac{1}{1-\sigma}} \left(\frac{x_{jj}/y_j}{y_j/y^w}\right)^{\frac{1}{1-\sigma}}\right)^{1-\sigma}$$

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{x_{ii}/y_i}{y_i/y^w}\right)^{\frac{1-\sigma}{1-\sigma}} \left(\frac{x_{jj}/y_j}{y_j/y^w}\right)^{\frac{1-\sigma}{1-\sigma}} \left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{1-\sigma}$$

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{x_{ii}}{y_i}\frac{y^w}{y_i}\right)\left(\frac{x_{jj}}{y_j}\frac{y^w}{y_j}\right)\left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{1-\sigma}$$

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{y^w}{y_i^2}\right)\left(\frac{y^w}{y_j^2}\right)\left(x_{ii}x_{jj}\right)\left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{1-\sigma}$$

$$x_{ij}x_{ji} = \left(\frac{y_i y_j}{y^w}\right)^2 \left(\frac{y^w}{y_i y_j}\right)^2 \left(x_{ii}x_{jj}\right)\left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{1-\sigma}$$

$$x_{ij}x_{ji} = \left(x_{ii}x_{jj}\right)\left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{1-\sigma}$$

$$x_{ij}x_{ji} = \left(x_{ii}x_{jj}\right)\left(\frac{t_{ii}t_{jj}}{t_{ij}t_{ji}}\right)^{\sigma-1} \qquad (2.9)$$

The size variables in the gravity equation (2.9) are not total income$y_i y_j$as in traditional gravity equations but intra-national trade $x_{ii}x_{jj}$. Intra-national trade does not only control for the countries' economic size, but, according to equation (2.7), it is also directly linked to multilateral resistance. Equation (2.9) therefore can be rearranged as:

$$\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}} = \left(\frac{x_{ii}x_{jj}}{x_{ij}x_{ji}}\right)^{\frac{1}{\sigma-1}} \qquad (2.10)$$

As shipping costs between *i* and *j* can be asymmetric $\left(t_{ij} \neq t_{ji}\right)$ and as domestic trade costs can differ across countries$\left(t_{ii} \neq t_{jj}\right)$, the tariff equivalent total trade costs $\left(\tau_{ij}\right)$ could also be obtained by subtracting one from a geometric mean of trade costs in both directions. The resulting micro-founded trade costs measure is denoted as τ_{ij}:

$$\tau_{ij} = \left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)^{\frac{1}{2}} - 1 = \left(\frac{x_{ii}x_{jj}}{x_{ij}x_{ji}}\right)^{\frac{1}{2(\sigma-1)}} - 1 \qquad (2.11)$$

Where τ_{ij}denotes the total trade cost (i.e., measures bilateral trade costs relative to domestic trade costs), $t_{ij}t_{ji}$represents the bilateral trade costs of countries *i* and *j,*and $t_{ii}t_{jj}$signifies the domestic trade costs of countries *i* and *j*. The measure of the international component of trade costs net of distribution costs in the destination country is given as $\left(\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}\right)$. This captures what makes international trade costly over and above domestic trade.

The intuition behind equation (2.11) is that a decrease in bilateral trade costs relative to domestic trade costs reduces total trade costs (τ_{ij}).Such decrease makes it easier for countries *i* and *j* to trade relative to domestic trade. This therefore implies that bilateral

trade flows $x_{ij}x_{ji}$ increase relative to domestic trade flows $x_{ii}x_{jj}$. Equally, an increase in bilateral trade flows relative to domestic trade flows could infer that it is easier for the two countries to trade (perhaps because bilateral trade costs have declined relative to domestic trade cost). This is therefore a reflection of a decline in total trade costs.

2.7.2 Review of Methods of Analysis

Generally, two methods were identified in the literature for analyzing the impact of trade costs on trade flows. The most widely used method is gravity model/econometric approach (comprising of both the traditional and the theory-based approaches). CGE model has also been used in some empirical analyses. The gravity regression /econometric approach is based on an ad-hoc and atheoretical specification of equations. Although the ex-post estimation technology practically yields very useful empirical results. Alternatively, CGE modelis theoretically sound and capable of analysing quantitatively the general impact on aggregated economy.

2.7.2.1 The Gravity Model

The gravity model is a common method of analysis in international economics. It is borrowed from Isaac Newton's Law of Gravitation in 1687.The lawposits that the force of attraction, F_{ij}, between two separate entities i and j is a positive function of the entities' respective masses, m_i and m_j, and inversely related to the squareof the distance, ${d_{ij}}^2$, between the objects.This law is formalized as:

$$F_{ij=}\ \mathrm{G}\ \frac{M_i M_j}{{D_{ij}}^2} \qquad (2.12)$$

Where F_{ij}represents force of attraction, $M_i$and M_j stand for respective two entities' masses, ${D_{ij}}^2$stands for distance between the two entities and G is a gravitational constant depending on the units of measurement for mass and force.

Intuitive gravity model of trade is therefore derived from this law since trade flow between two countries is equivalent to economic mass of each country, commonly measured by GDP. This is divided by distance (i.e., trade costs) between the countriesand raised to the power of another quantity to be determined (Christie, 2002; Krugman & Obstfeld, 2009).

The basic gravity model was originally developed by Tinbergen (1962) and Poyhonen (1963). It was used in analysing bilateral trade flows patterns amongst the European countries.Nevertheless, the model has cropped up a lot of controversies. For instance, its theoretical background was put into doubt but subsequently justified by Anderson (1979) for differentiatedgoods based on their origin. Also, in Bergstrand (1989) for the factorial model, Deardorff (1998) for the H-O model,and Helpman *et al.* (2008) in the context of firm heterogeneity. Besides, the model has been validated by recent theoretical and empirical studies (Frankel, 1997; Feenstra*et al.,* 1998;Evenett & Keller, 2002; Anderson & Van Wincoop, 2003) through the inclusion of other important determinants of bilateral trade. These include GDP per capita,population, regional trade agreements and other time invariant variables such as common colony, language/ethnicity etc.

Despite its empirical success, gravity model has been subjected to a lot of criticism and limitations[23]. These criticisms have led economists to investigate the theoretical linkage between the gravity equation and trade theories. Following Anderson (1979), economists have found the possibility of deriving gravity equation from different trade models, such as Ricardian, H-O, and increasing returns to scale (IRS) models (Helpman & Krugman, 1985; Bergstrand, 1990; Markusen & Wigle, 1990; and Deardorff, 1998). Feenstra*et al.* (2001) has been able to show how various trade models could be differentiated using gravity model. In the same manner, Evenett and Keller (1998) have also explained gravity model using different trade theories. They further showed thatboth the traditional theories that assumes constant returns to scale (CRS) and the more recent theories that assume increasing returns to scale (IRS) could be used in the derivation of gravity model.

However,in the nineties,subsequent to several debates about gravity model specification,the argument therefore has shifted towards the performance of different estimation techniques. Regarding the new estimation issues, the validity of the log linearisation process of gravity equation in the presence of heteroskedasticity and existence of zero trade flows have also been explored.

2.7.2.1.1 Potential Issues in Estimating Gravity Models

[23] See Hummels and Levinsohn (1995) or Evenett and Keller (2002) for detail of the criticisms and boundaries of gravity model.

Some common problems crop up particularly when estimating gravity model. The problems have led to adoption of several techniques in estimating gravity model. Each of the techniques has its merits and demerits.Also, none of these techniques can be affirmed to completely outperform the others. Some of these common problems associated with estimating gravity model include endogeneity, heteroscedasticity, unobserved heterogeneity, and zero trade flows (Gomez-Herrera, 2013).

When estimating gravity models, issue of *unobserved heterogeneity*always crops up, particularly, existence of unobserved differences between individual and/or bilateral country pairs. This leads to wrong specification of the model and as well making estimation to be baised (Dougherty, 2011 and Bacchetta *et al.,* 2012). Moreover, existence of multilateral resistance to trade could be responsible for *unobserved heterogeneity* (Akesson& Karlberg, 2015). Given this situation, either multilateral resistance variables or remoteness could be used to address its source (Anderson & van Wincoop, 2003).Alternatively, panel data analysis with the aid of fixed effect OLS or fixed effect PPML could be used to solve estimation issues arising from *unobserved heterogeneity* (and also multilateral resistance to trade). A number of studies ((Bourdet & Persson (2011, 2012), Portugal-Perez & Wilson (2008, 2010), Martinez-Zarzoso *et al.* (2007), Deen-Swarray *et al.* (2012) andEzzat (2015)) have not only used panel data but also fixed effect PPML in its original multiplicative form. This suggests that zero trade flows observations present within the database do not have to be dropped. Also, due to existence of heteroscedasticity, PPML estimator becomes consistent.

In gravity equation, both fixed and random effect estimators are often used to account for unobserved heterogeneity. The former assumes that unobserved heterogeneous is constant over time and in different way affects each individual country in a panel. On the other hand, the latter assumes absence of correlation imposed between individual effects and the regressors (Gómez- Herrera, 2013). Random effect model is more efficient particularly, under the null hypothesis of zero correlation.[24] Though, fixed effects model tends to give consistent estimate provided the null hypothesis is rejected.

The problem of *endogeneity*in a regression model occurs when at least one of the explanatory variables and error term are correlated. When such issue occurs, using

[24]Hausman test is a technique used to test for suitability of random effect (RE) model. It suggests inconsistent of RE model if the null hypothesis is rejected. Based on this, the result does not suggest fixed effect model is more suitable.

OLS technique becomes inappropriate because its estimate will be inconsistent (Hoekstra, 2013). Specifically, *endogeneity*issue is caused by omitted variables, measurement error or simultaneity (Dougherty, 2011). In a gravity equation, it is more rational to consider a country with higher exports volume having an efficient trade procedure and thus lowers cost to export. In this case, exports volume is considered a function of cost to export. On the other hand, the variable cost to export may be dependent upon exports volume and also by extension affected by other factors captured in the error term. This therefore makes both explanatory variable and error term to be correlated. In solving *endogeneity*problem, fixed effects estimator can be used though its solution is inadequate because itonlyaddresses*endogeneity*problem caused by omitted variables (Akesson & Karlberg, 2015).

The use of instrumental variables (IV) is an alternative approach to solve for each potentially endogenous variable in the model and such instrument must be exogenous to the error term. Furthermore, high correlation must exist between the chosen instrument and the suspected endogenous variable it substitutes in order to ensure that the IV is effective (Akesson & Karlberg, 2015). Therefore, estimation can be done using 2SLS technique. However, it is difficult to find a well performed instrument as weak instruments create other (Wooldridge, 2012).

The 2SLS estimator may be used to a more complex model with multiple endogenous explanatory variables(Wooldridge, 2012). In estimating such a complex model, studies such as De (2007), Korinek and Sourdin(2009),Behar*et al.* (2009), Bugel (2010), and Ackah *et al.* (2012) employed 2SLS estimation technique in order to ensure unique set of parameter values for a given instrument list.Besides, *endogeneity* issue can be addressed with a natural source of instrument. This involves the use of time-lagged versions of the potentially endogenous variable (Bacchetta *et al.,* 2012). In such case, Bougheas*et al.*(1999) jointly estimated four cross section equations using Seemingly Unrelated Regression (SUR) estimator, so as to allow existence of correlation between the error terms, since the errors for pairs of countries may be dependent[25].

In case OLS assumptions (i.e., homoscedastic and uncorrelated of errors) are violated, the use of OLS technique becomes inappropriate because its estimate becomes inefficient and the standard error will be biased. Given these conditions, Iwanow and

[25]A similar approach was taken by Wei (1996).

Kirkpatrick (2009), Adewuyi and Bankole (2012) and Vidavong (2013) used generalized least squares (GLS) estimator as an alternative and efficient techniquein transforming the model equation to a new model whose errors are uncorrelated and have equal variances.While using IV, including one lag period of dependent variable is difficult to consider as additional explanatory variable. Therefore,Generalized Method of Moments (GMM) technique is considered unsuitable solution for endogeneity, rather a more of an econometric trick. Therefore, a number of studies (Greenaway *et al.,* 2009; Kareem, 2009; andGaytaranov *et al.,* 2013) have also corrected for endogeneity using GMM and GMM-instrumental variables.

Heteroscedasticity is another problem commonly associated with estimating gravity model. It arises from non-constant of variance of the error term for all observations. In consequence, the estimation becomes inefficient and unnecessarily large standard errors (Akesson & Karlberg, 2015). The use of robust standard errors is a simple approach to solve *heteroscedasticity*problem (Nordas & Piermartini, 2004; Portugal-Perez & Wilson, 2008; Kee*et al.,* 2008; Greenaway*et al.,* 2009; Lawless, 2010; Hoekman & Nicita, 2011; Miroudot*et al.,* 2012; Duval & Utoktham, 2011b; Arvis*et al.,* 2013; Jalerajabi & Moghaddasi, 2014; and Osnago *et al.,* 2015). However, the log-linearisation of the gravity equation would require changing the property of the error term,therefore leading to inefficient estimates due to existence of *heteroscedasticity* (Gómez-Herrera, 2013). Also, using OLS in its logarithmic form will render estimation inconsistent. This makes the problem unsolved using robust standard errors. Alternatively, Santos Silva and Tenreyo (2006) suggested the use of non-linear estimation technique, such as PPML to solve such a problem. PPML is considered a more efficient technique relative to non-linear methods such as non-linear least squares (NLS).

Existence of zero trade has also been recognized in the level of tradebetween any two countries. *Zero trade flows* occur when there is no trade relation between two countries at a given period. In such case, zero figure will be assigned to those periods with no trade transaction. For instance, data on total bilateral trade used by Santos Silva and Tenreyro (2006) and Helpman*et al.* (2008) contained almost 50 percent zero observations. The issue of zero trade may be as a result of non-reporting, errors or omissions. It may also be a reflection of rounding error assocaited with very small

trade flows. However, it is apparent that existence of *zero trade flows* between country pairs reflects a true absence of trade, rather than rounding errors (Martin & Pham, 2015). In estimating a gravity model, taking logarithms is required. This makes z*ero trade flows* posing problemsas the logarithm of zero is undefined. This implies zero observations in the data-series should be dropped, upon which the estimation may yield inconsistent results (Bacchetta *et al.,* 2012). In the presence of zero observations, the natural log of the import variable may be applicable, particularly when using OLS technique.

Salvatici (2013) suggested three alternative approaches through which the issue of *zero trade flows* can be solved:

i. Truncating the sample by dropping zero observations and then use OLS technique to perform log-linear form of estimation (truncated OLS). This approach is of course simple in its application but result to removal of zero observations and biased estimates.
ii. The value of trade in the data-series should be added with a small constant (1 dollar, for instance) before taking logarithms i.e., replacing zero trade observations in the data-series by $x_{ij} + 1$. Using OLS technique in this case is incorrect. This is because a small constant value added to the data-series to avoid dropping of zero observations is *ad hoc* in nature. This does not mirror the underlying expected values, thus yielding inconsistent estimates.
iii. Estimating the model in levels. Applying OLS technique for such a model is theoretically not supported by founded gravity equations that present a multiplicative form.

Similar to the problem of heteroschesticity discussed earlier, Santos Silva and Tenreyro(2006) also suggested the use of non-linear estimation method (i.e., PPML) to solve the issue ofzero observationspresent in a data-series. This helps eliminating the need to transform the import variable using the natural log.Apart from the fact that PPML estimates is unbiased, it also ensures equal weight for all observations and that its mean is always positive. In using truncating approach which required dropping of zero observations from the data-series, Helpman *et al.* (2008) suggested sample selection estimation as an alternative method to solve zero observations being dropped.

In case there is high number of zero observations beyond what is expected for Poisson or Negative Binomial distribution, Salvatici (2013) proposed the use of either Zero-Inflated Poisson Model (ZIPPML) or Zero-Inflated Negative Binomial Model (ZINBPML). Dennis and Shepherd (2007) and Ackah *et al.* (2012) applied Negative Binomial Model together with OLS, Tobit and Poisson to check for robustness.

Besides, several studies have also examined the trade costs determinants or trade costs and trade flows nexus using econometric approach (binary choice model).For instance, Hummels (2001) used probit model with the aid of matrix of shipping times between ports in the world and U.S entry ports. Ueki (2015) with the aid of World Bank's 2009 and 2010 enterprise surveys employed both binary probit estimator and quantile regressions. Bernard*et al.* (2006) employed two different techniques (i.e., Logit and OLS regression) with the aid of new datasetconstructedfrom censuses of manufactures (CM).

2.7.2.2 The Computable General Equilibrium (CGE) Model

CGE model is a trade policy analysis derives from the theory of General equilibrium as put forward by Leon Walras. It is being used in neoclassical theory and as well classical trade theory, especially in the dimension of international trade. The modelcomprises equations representing both demand and supply conditions of various sectors existing in the economy (Asia-Pacific Economic Cooperation (APEC), 1997)). The sectors are connected through value chain analysis with which goods are processed from their raw nature to the final stage for consumption.

In CGE model, there is existence of sectoral linkages through a number of economy-wide constraints. For instance, limited supply of factor inputs brings about high competition among firms operating in different sectors.This makes expansion in one sector go along with a contraction in another sector, except such expansion is associated with technology improvements that economize resources. In the classical framework, resources allocation and competition are corrected through price movement (APEC, 1997).

With respect to international trade, the CGE model can as well show how a change in the trade sector could cause economy-wide changes. Therefore, a number of studies (Brooks & Stone, 2010; Minor & Tsigas, 2008;Abe & Wilson, 2008; and OECD,

2003) have used the CGE models to analyse the impact of certain variables that are related to trade costs. For example, Abe and Wilson (2008) adopted Version 7 of the Global Trade Analysis Project (GTAP) database with its base year at 2004. As studies had used the GTAP old versions database consisting of several members of economies, industries/commodities, sectors and regions, Minor and Tsigas (2008) however employed new GTAP database for time value in trade using World Bank doing business indicators. Lastly, OECD (2003) used GTAP database for 102 OECD countries with data from World Competitiveness Yearbook, Global Competitiveness Report and UN/CEFACT databases.

2.7.2.3 Concluding Remarks on the Reviewed Methodologies

The review of the various methodologies and their respective techniques for analysing the impact of trade costs on trade flowsshows that the use of gravity dominates the entire literature, particularly when analysing bilateral trade relations. The review also shows that gravity model has been estimated using different techniques largely influenced by the nature of the dependent variable used and potential issues that crop up during estimation. From the review, it became imperative that each of the techniques is determined predominantly by its strengths and weaknesses. For instance, the use of OLS renders the estimation inconsistent when there is heteroscedasticity. Given this, using non-linear estimation technique i.e., PPML as alternative method was suggested. In addition, due to endogeneity problem which the use of OLS could not solve, the use of instrumental variables (IV) such as 2SLS, GMM, GLS, SUR become appropriate. However, these techniques only offer solution to the problems of heteroscedasticity and endogeneity, they did not account for country specific effects. To account for country specific effect therefore, the use of fixed effect and random effect become appropriate. Furthermore, to deal with the problem of zero trade flows, the use non-linear model such as PPML, tobit, probit and logit estimators have been suggested. Given theseconditions, the current thesis estimates gravity equations within the framework of panel instrumental variables (IV)estimator, specifically pooled two-stage least squares (2SLS) technique. The rationale for this technique is due to the fact that it helps solving heteroscedasticity, endogeneity problems andat the same time account for heterogeneity problem leveraging on fixed and random effects models.

2.8 Review of Empirical Literature

This section reviews empirical studies on trade costs and trade flows relationship. The existing literature on the relationships between trade costs and trade flows can be classifiedbroadly into five categories, namely: trade policy barriers, trade-related infrastructure barriers, domestic regulatory barriers, institutional quality barriers and overall trade costs.

2.8.1 Studies on Trade Policy Barriers and Trade Flows

Series of studies have assessed the impacts of trade costs associated with trade policy barriers on trade flows for developed and the developing countries. Kee*et al.* (2008), for instance,used trade restrictiveness index to account for different forms of trade protection across 78 developed and developingcountries. The results reveal that as developing countries adopt more restrictive measures of trade policies, their exports are also faced with higher trade barriers. This may be elucidated by reciprocity in bilateral and multilateral trade agreements. The results further show that across countries, contributing share of NTBs to trade restrictiveness is greater relative to tariff.

Duval and Utoktham (2011a) estimated and analysed intra and extra regional trade costs across four Asian sub regions: ASEAN, SAARC[26], North and Central Asia, and East and North-East Asia over a period 1988-2008. The results show that tariff share of the overall trade costs for the regions accounted for about 10 percent or less. This is therefore an evidence that attention of trade policy makers and negotiators should be directed towards reducing NTBs and embark on trade facilitation measures across the regions.

In a bilateral comprehensive trade costs (CTC) expressed in tariff equivalent form,Duval and Utoktham (2012) estimate bilateral trade costs at aggregate and sectoral levels for 107 countriesfor the period 1988 to 2010. Out of these countries, 48 were Asian or South Pacific economies. Their findings reveal that while significant improvements have been made by most countries and sub-regions towardsreducing trade costs, still, costs of trading among Asian sub-regions are relatively higher than costs required when trading with developed countries outside the region. Other of this finding was that tariff accounted for less than 10 percent of the CTC. At sectoral level,

[26]ASEAN means “the Association of Southeast Asian Nations” while SAARC means “the South Asian Association for Regional Cooperation”.

despite exception of tariff, costs associated with agricultural products were systematically found to surpass that of manufactured products. It is also clear from the estimates that trade costs imposed by most developing countries on agricultural products doubled that of the manufactured products. Therefore, the policymakers were required to focus on trade facilitation efforts so as to reduce NTBs and stimulate the productive sector (agriculture) towards reducing poverty, ensure inclusive and sustainable development.

Jalerajabi and Moghaddasi (2014) conducted a study covering 15 developing countries for the period 1995-2010. The authors measured agricultural bilateral trade costs in Iran and found that weighted average of such costs with developing partners had declined significantly by 44 percent. However, such a decline was larger for Brazil and UAE. Also, lag of agricultural bilateral trade costs variables, tariff rate and distance had positive effect on Iran's agricultural bilateral trade costs. Conversely, island and adjacency variables hadnegative effect.

Melchior, Zheng and Johnsen (2009) estimated the impact of tariffs on Norway's exports to at least 20 countries, MFN tariffs in 2007. Their findings reveal that trade could increase by 4.2-12.9 billion NOK, equivalent to 1.2 to 3.7 percent of Norway's non-oil exports in 2007. In a panel study comprising 149 developed and developing countries exportingHS6 products to 102 destinations,Osnago*et al.* (2015) examined the effects of trade policy uncertainty (TPU) on margins of trade (i.e., both extensive and intensive margins). Their findings show that an essential barrier to export was trade policy uncertainty. On average, elimination of binding overhang increasedexports probability by 12 percent. The study also found higher negative impact of TPU for countries with low institutional quality. Finally, their results revealthat trade policy uncertainty corresponds to tariffs level between 1.7 and 8.7 percentage points on average.

Gaurav and Mathur (2015) measured bilateral trade costs of India with EUover a period 1995-2010. The results confirm 20 percentage points decline of Indian tariff equivalent with EU for the period under consideration, with greatest decline experienced by Latvia and Malta. Also, the results from Novy's model reveal that greatest percentage of bilateral trade growth was driven by significant decline in bilateral trade costs. To some extent, this was offset by decline in multilateral

resistance terms through which trade was diverted to other trading partners, mostly in North America and South and South-east Asia.

In Africa, Kareem (2009) examined theeffect of trade restrictions on access of Africa's exports to both industrialized and developing markets. The result reveal that low accessibility of African exports to both markets were not limited to imposition of trade restrictions alone, but also inadequate production capacity to meet up with market access. With the aid of unconditional general equilibrium frameworks,Ackah*et al.*(2013) estimated tariff equivalent trade costs for ECOWAS countries during the period 1990-2009. The results show that an average ECOWAS countries traded with their trading partners at a tariff equivalent trade cost of 268.2 percent. This was relatively higher compared with countries from other regional blocs within and out of SSA. In respect of trade flow involving ECOWAS countries, the findings indicate that trading among average ECOWAS members involve lower trade costs relative to partners from economic blocs out of ECOWAS. However, for countries within ECOWAS, the findings reveal that Cote d'Ivoire had the lowest intra-ECOWAS trade costs compared with Ghana, Nigeria and Benin, respectively.

Existing studies on the impact of trade policy barriers reveal its negative relationship on trade flows. All these studies used panel data and were conducted for developing countries, except Kee*et al.* (2008), Duval and Utoktham (2012), Osnago *et al.* (2015) and Gaurav and Mathur (2015),conducted for both the developing and developed countries. Most of these studies used aggregate trade data although sectoral trade data were used by Duval and Utoktham (2012) and Jalerajabi and Moghaddasi (2014). With respect to their specific trade costs measures, Duval and Utoktham (2011a), Duval and Utoktham (2012), Ackah*et al.* (2013) and Gaurav and Mathur (2015) computed tariff equivalent trade costs using micro-founded approach by Novy (2010 and 2013).Jalerajabi and Moghaddasi (2014) focus ontariff while Osnago *et al.* (2015) on gap between bound rates and effective applied tariffs. However, Kee *et al.* (2008) focused on TRRI and OTRI. The studies adopted different methodologies. Ackah *et al.*(2013),for instance, employed unconditional general equilibrium model while Jalerajabi and Moghaddasi (2014) employed panel gravity model. An econometric approach, elasticity approach and non-parametric model were used by Kee*et al.* (2008), Duval and Utoktham (2011a; 2012)and Osango *et al.* (2015), respectively.

2.8.2 Studies on Trade-related Infrastructure Barriers and Trade Flows

A number of studies have been undertaken on the crucial role of trade costs associated with trade-related infrastructure barriers on trade flows. This sub-section attempts to assess the impact of trade-related infrastructure barriers on trade flows among developed countries. For instance, Bougheas*et al.* (1999) examined how infrastructurethrough its influence on transport costs could affect trade across European countries over a period 1970-1990. Their findings show that even thoughvolume of trade is positively affected by infrastructure, still their theoretical proposition emphasized that increasingthe volume of infrastructure were not always welfare improving. The results also demonstrate that the benefits of additional investments on high levels of infrastructure in terms of increased trade volume were outweighed by the loss in final output.

Hummels (2001) examined how time and magnitude of time costs as trade barriers affect patterns of trade. He further evaluated the value,weight, freight and insurance charges by transport mode for U.S imports with detail by product groups, exporter and district of entry for the 1974-1998 period. The estimated results indicate the probability of reducing the U.S imports by 1-1.5 percent from country that require extra time (day) in transport. With improvement in customs clearance, shipping time would also reduce by one-day, equivalent to about 0.8 percent decline in ad-valorem tariffs. Baier and Bergstrand (2001) disentangled relative contributions of reduced transport-cost, tariff liberalization and income convergence on world trade expansion. The authors considered 16 OECD countries for the period between late 1950s and late 1980s. The findings reveal that roughly 67-69 percent of trade growth could be ascribed to growth in real GDP, 23-26 percent of decline in tariff and preferential trade agreements (PTA), and 8-9 percent of reduced transport cost but none by income convergence.

The crucial role of trade-related infrastructure barriers is not limited to only the level of trade occurring among the developed countries but also among developing countries. Series of studies have also assessed its impact on trade flows among the developing countries. Limao and Venables (2001) for instance, investigated the transport costs' determinants on geography and infrastructure for a sample of 103 countries during 1990. From the computedestimates, trade flows elasticity with

transport costs factor of around -3, confirm the importance of infrastructure variable in determining trade. The results show that deteriorating status of infrastructure from 50th to 75th percentile increases transport costs by 12 percent points and decreases traded volumes by 28 percent. In addition, the results show that poor state of infrastructure in Africa was essentially responsible for its low trade flows. Busse (2003) examinedhow various forms of transaction costs and their relative levels in developing countries. The findings suggest that an efficient transport and services infrastructure could reduce transaction costs.This was considered a necessitytowards achieving significant growth and development in the economy.

Among developing Asian countries, Brooks (2008) used both hard (physical projects) and soft (institutional) or infrastructure development and services to investigate how trade costs influenced by infrastructure development affect Asia's trade flows and patterns. The findings show that investment in infrastructure could help reduce costs of doing business, maximize growth and benefits regional integration in Asia.His findings also show that further improvements in infrastructure accompanied by trade expansion, would fascinate more investment in productive capacity, increase markets access and employment opportunities, and widen consumers' choice.

Amiti and Javorcik (2008) examined the drivingfactors of foreign firms' entry in China. The study considered 515 manufacturing industries at a highly aggregated level across 29 Chinese provinces during the period 1998-2001 based on 4 digit Chinese Industrial Classification. The findings show that both market and supplier's access were basically essential for foreign entry. Results further indicate that markets access mattered more in the province than other parts of China. This result was consistent with market fragmentation due to informal trade barriers and as well underdeveloped nature of transport infrastructure.

Abe and Wilson (2009) in a regional trade across developing countries in East Asiaexaminedthe effect of port infrastructure on trade and the role of transport costs in driving trade for the region. The results of their findings reveal that high transport costs from both Japan and U.S to East Asia was due to port congestion. The analysis proposes that while port congestion in East Asia was reduced by 10 percent, transport costs could also be reduced by about 3 percent. This therefore implies that there was across-the-board tariff cut by about about 0.3 to 0.5 percent. Brooks and Stone (2010)

examined the roles of hard and soft infrastructure towards improving trade facilitation among APECmembers. Their results indicate trade gains arisen from significant reduction even a comparatively modest one in trade costs. Also, the result shows that increase in the GDP of the region was as a result of diversification of trading patterns.

To explore the impact of trade cost and export specialization on Laos's export performance, Vidavong (2013) applies two models: the aggregate model covering from 1986 to 2010 for export of Laos to 24 of her trading partners, and the disaggregated model from 2001 to 2010 covered 12 main trading partners with 10 top products exported (4 digit, HS). The findings confirmthat export activities of Laos could be accelerated provided both trading countries maintained further improvement in their infrastructural quality. Although, the magnitude of the effect of infrastructure development was stronger for importing country than that of the exporting country. In addition, export specialization had potential to boost trade and that a 10 percent change in specialization could stimulateexport growth by about 43 percent.

As trade relation is not only horizontal but also vertical in nature, studies have therefore analysed the impact of trade costs associated with trade-related infrastructure barriers on trade flows between developing and developed countries. Following the findings of (Limao & Venables, 2001; Wilson *et al.,* 2003; and Clark *et al.,* 2004) that reveal significant positive impact of infrastructural quality on trade. Nordas and Piermartini (2004) evaluated such impact on trade performance of 138 countries during the period 1996-2000. Their results also show that infrastructural quality was a major determining factor of trade performance. Among infrastructural indicators, port efficiency was discovered to have had the greatest impact. However, telecommunication accessibility and timeliness determined the competitiveness of clothing and automotive sectors.

Korinek and Sourdin (2009) explored the role of maritime freight costs in determiningthe ocean-shipped imports. The results indicate a strong impact of maritime transport costs on trade. An increase in maritime transport costs by 10 percent was estimated to 6-8 percent reduction in trade, ceteris paribus. Generally,maritime transport costs has great impact while the magnitude of changes wouldproduce significant impact on trade flows. Also, in another model using product-level data, the results reveal that an increase in shipping costs by 10 percent would

bring about a reduction in trade by 3 percent. The overall analysis therefore showasthe impact of distance between trading partners was rising, that of the maritime transport costs over time was falling.

In a trade relation across the World, Behar and Venables (2011) investigatedhow volume and nature of international trade are affected by transport costs.Their finding corroborate with the World Bank (2009) which emphasized the significance of broader measures trade facilitation measuresas a means towards reducing transport costs and improve trade volumes across the World. Seck (2014) based his analysis on 105 countries (with 19 from Africa) for analysing the degree of contribution of different trade costs elements towards shaping African trade patterns both within and outside the continent for the period 2010-2012. His findings indicate thetendency that increased trade flows with trade facilitation is contingent on the nature of commodity being traded with, trade costs measures, export destination and the country involved in the bilateral trade relationship which costs were accounted for. Also, the finding reveals the possibility of increasing total trade from 6.8 to 15.1 percent provided average African country could be raised to the world best performing country through provision of trade reforms aiming at physical infrastructure, particularly roads.

In Africa, Deen-Swarray*et al.* (2012) investigated the magnitude of infrastructure development and its impact on trade and integration among 12 West African countries for the period 1993-2008. Their findings reveal a substantial and relatively greatimpact of infrastructure on bilateral trade flows. This according to them, was because poor state of infrastructure along the major corridors adds to high cost of transport and as well inhibits trade.

Results of studies on the impact of trade-related infrastructure barriers have though found a significant and negative relationship on trade flows. Nevertheless, there was element of divergence in their conclusions. For instance, some of the studies that used indicators such as transport costs, time costs, port efficiency, shipping costs, communications infrastructure and physical infrastructure (Hummels, 2001; Baier & Bergstrand, 2001; Limao & Venables, 2001; Busse, 2003; Nordas & Piermartini, 2004; Brooks, 2008; Abe& Wilson, 2009, Brooks & Stone, 2010; among others) concluded on a significant trade potential and welfare gains associated with trade costs reduction. On the contrary, Bougheas*et al.* (1999) subjected their conclusion to theoretical

proposition that increasingthe volume of infrastructure were not always welfare improving. Aggregate trade data within the panel framework were used by these studies across developed countries, developing countries and even those conducted for both except Limao and Venables (2001) that employed cross-sectional data. On the methodology adopted, majority of the studies employed gravity model with the exception of Hummels (2001) and Brooks and Stone (2010) that adopted the use of econometric approach and CGE model, respectively.

2.8.3 Studies on Domestic Regulatory Barriers and Trade Flows

There is no country that is self-sufficient; countries irrespective of their categories tend to engage in trade with each other. However, trade relations among countries have been adversely affected not only because of high production costs but also due to high trade costs associated with domestic regulatory barriers. Based on these facts, studies have assessed the impact of trade costs related to domestic regulatory barriers on trade flows between developing and developed countries. Djankov *et al.* (2006), for instance, estimatedhow trade volume is affected by time costs across 126 countries over a period 2001-2003. Their study reveals that delaying a product by one-extra day before being shipped lowers trade by at least 1 percent. The results further show that agricultural products being a time-sensitive goods has greater effect. They found that time delay by one-extra day tend to reduce country's exports of such commodities by 6 percent on average.

Nordas*et al.*(2006) used a dataset of 192 countries to study the relationship between time to export and import, logistics services and trade during the period 1996-2004. Their findings show that probability to export was largely determined by time. Inassessing the relative impact of trade-related institutional constraints and trade facilitation on African manufacturing export performance, Iwanow and Kirkpatrick (2009) used a new panel dataset comprising 124 countries, out of which 25 are SSA for the period 2003–2004. Their findings reveal that African export performance could certainly be improved through trade facilitation reforms. Also, African export growth could be facilitated through other reforms considered more essential than border reforms. Such reforms include improved quality of transport and communication network and improved regulatory environment.

Sadikov (2007) estimated how both export signature and procedures for registering business affect country's aggregate exports.The author considered a sample of 345 freight forwarders and customs officials across 126 countries in 2005. His findings indicatethat one-extra signature required by exporters prior to shipment lowers aggregate exports by 4.2 percent. Such effect was large and equal to raising importer's tariff by 5 percentage points. Also, the results show that one-extra signature required tend to reducedifferentiated goods exported by 4–5 percent relative to homogeneous goods. And finally, it is shown that only exports of differentiated products are affected by business registration procedures.

Minor and Tsigas (2008) estimated the economic implications of time reductionon trade across borders of four groups of countries: low-income SSA, all low-income, middle-income, and high-income level countries. Their results thereby indicate that lowering time required to trade across borders considerably impact on GDP of countries involved.Also, it was found thatsuch effort could enable SSA countries having larger exports share of higher value-added products and thus widens intra-regional trade.Using a data from the Doing Business Survey, Bourdet and Persson (2011)tested how efficient trade procedures affect margins of trade among the Non-EU Meditarranean countries and EU countries for the period 2006-2009.The finding reveals that both export volumes and diversification could significantly be expanded through trade facilitation. Using the indicators combined with data on tariff equivalents from Hummels (2007), Bourdet and Persson (2012) estimated the effect of trade procedures on exports from non-EU countries. Their results reveal that ability to synchronize import procedures to the current level of most efficient EU countries would encourage an average non-member to expand their aggregate exports by about 20 percent to the EU.

While examining the impact of trade costs associated with domestic regulatory barriers among the developing countries, Martinez-Zarzoso and Marquez-Ramos (2008) analysed how trade facilitation measures affect sectoral trade flows using disaggregated trade data for 167 importers and 13 exporters in the year 2000. Their results however indicate that lowering time required to trade and transport costs could boost trade flows. Also, their results show that the WTO multilateral initiatives could bring about potential benefit in terms of trade expansion and that the benefit wouldcut across country that improves her trade facilitation and in extension to its trading

partners. As a result, it is imperative that both trading partners made efforts to improve their trade facilitation. This would enable them to reap the associated trade gains. Although, partners with longest delays time due to high trade procedures on the border are required to have greater efforts.

Behar (2009) analysed how documentation requirements affect exports of 119 countries all over the World. The estimated results suggest that one more document required reduces exports of an average-size countryby 7 percent. However, as large as the world average, African countries were still below 5 percent. For a sample of 86 exporters and 111 importers, Behar*et al.* (2009) investigatedlogistics and bilateral exports nexus for developing countries. The results indicate that improving logistics by one-standard deviation could enable an average-sized country to expand her exports by about 46 percent. Although, the effect of multilateral resistance differs across country size and that most countries were much smaller than average.

Ueki (2015) investigated how export intensity and propensity of enterprises in Southeast Asia (SEA) and Latin America (LA) are affected by trade costs. The surveys covered SEA countries with large manufacturing activities during 2009 and 5 different survey in LA during 2009 and 2010. The author finds no substantial effect of trade impediments on export intensive enterprises. A comparative analysis also reveals that unfavourable environments suffer by export-intensive enterprises in LA do not encourage integration of such enterprises into global production networks.

In Sub-Saharan Africa, Freund and Rocha (2010) found significant effect of transit delays on exports. Although, the effect was lower for time-insensitive goods relative to time-sensitive goods. High uncertainty in road transport could also lead to long time through which delivery targets of exporters could be jeopardized. In addition, the results indicate thatlessening inland travel times by a one-extra day could improve exports by 7 percent.

Existing studies on domestic regulatory barriers have clearly revealedits significant negative impact on trade flows. These studiesemployed gravity model with exception of Minor and Tsigas (2008) and Ueki (2015) that employed CGE model and survey method. These studies were conducted across developed countries, developing countries and for both. Aggregate trade data were used within the panel framework except, Sadikov (2007), Martinez-Zarzoso and Marquez-Ramos (2008) and Freund

and Rocha (2010) that conducted cross sectional study. In terms of specific indicator used, Iwanow and Kirkpatrick (2009), Martinez-Zarzoso and Marquez-Ramos (2008), Freund and Rocha (2010) and Ueki (2015) all used the overall indicators of the doing business (i.e., time required, costs and documents required to export and import). However, Behar (2009) used only documents required to export while Bourdet and Persson (2011, 2012),Behar*et al.*(2009), Minor and Tsigas (2008), Djankov*et al.* (2006), and Nordas*et al.* (2006) considered only time required to export and import.

2.8.4 Studieson Institutional Quality Barriers and Trade Flows

Considering institutional quality as an indicator of trade costs, very few studies have explored its impact on trade flows among the developed countries. Helble*et al.*(2007), for instance, assessed howAPEC bilateral trade was affected by transparency improvement. Their findings reveal that with improvement in transparency as a trade policy measure, there was great potential for trade growth in APEC. Such improvement was estimated to bring about expansion in intra-regional trade among APEC members by 7.5 percent. In a related study, Abe and Wilson (2008) examined how minimizing corruption and transparency improvement contribute to trade costs reduction in APEC. Their results show that with improved transparency and reduced corruption, APEC members could significantly reap trade and welfare gains attached to such provisions. Further, the analysis suggests that members' efforts towards raising transparency to the level of regional average could expand regional trade by 11 percent while improve global welfare by $406 billion.

Analysing the impact of trade costs associated with institutional quality barriers on trade flows among the developed countries cannot be overemphasized. There are other studies that examined its impacton trade flows between developing and developed countries. Bandyopadhyay and Roy (2007), for example, employed both time-series and cross-section data covering 88 countries during the period 1982-1997 in order to explore how corruption impedes trade. Their results indicate that greater corruption bring about higher import duties and other related taxes, and thus reduced the trade GDP ratios of individual countries. In a similar study using the same dataset, Bandyopadhyay *et al.*(2015) constructed two graphs showing corruption index and level of exports/imports nexus for 171 countries over a period 1982-1997. Their findings from the graphs showexistence of inverse relationship between corruption and

export/import GDP ratios. This signifies that corruption is considereda majorhindrance to trade.

Anderson and Marcouiller (2000) examined how insecurity acts as a hidden tax on trade. They conclude in their results that international trade could significantly be hindered due to transactions costs associated with insecure exchange. In addition, increasing transparency and impartiality index of a country by 10 percent could bring about improvement in import volumes by 5 percent, ceteris paribus. In a Preferential Trade Agreements (PTA), Bugel (2010) examined the impacts of country's institutionaluncertainty on trade and how PTA affects country's trade vector. The results showthat controlling for other institutional measures, uncertainty has significant and negative impact on the intensive margin of trade. The analysis further that in a bilateral trading environment, reducing institutional uncertainty by 10 percent could increase import volumes by 2.4 percent. Also, the intensive margin of trade could rise by 3.8 percent given that institutional quality (that accounts for the degree of uncertainty) improved by 10 percent, ceteris paribus.

Iwanow (2011) assessed qualitatively the importance of institutional factors onexport performance of 109 countries during 2003-2004period. It was found that improved institutions could definitely contribute to higher export performance, though institutional importance rises with industry complexity. Also, existence of improved institutional setup could enable countries with such provision to export relatively more in a more complex or contract dependant industries.

Previous studies have also shown a negative impact between indicators of institutional quality barrier and trade flows. Some of these studies were conducted basically for group of developed countries while some other studies considered both developed and developing countries using aggregate trade data within the panel framework. Some of these studies, for instance, Bandyopadhyay and Roy (2007) and Bandyopadhyay*et al.*(2015) employed econometric approach. Anderson and Marcouiller (2000), Helble*et al.*(2007) and Iwanow (2011) employed gravity model while CGE model was employed by Abe and Wilson (2008). Regarding the specific measures of trade costs, Bandyopadhyay and Roy (2007) and Bandyopadhyay*et al.* (2015) focused on corruption and poor institutions. In a study by Helble*et al.* (2007), institutional quality

(trade costs) was measured only by transparency while Abe and Wilson (2008) considered both corruption and transparency.

2.8.5 Studies on Overall Trade Costs and Trade Flows

This sub-section of the review considered extensively studies that combined two or more indicators of trade costs so as to examine their possible impact on trade flows. Such studies among developed countries include: OECD (2003) explored possible effect of trade facilitation on transaction costs across 102 OECD member countries with consideration to both the direct and indirect transaction costs. The analysis thereby suggests that each of the transaction costs incuured amount to 1-15 percent of value of traded goods. Though, reducing trade transaction costs for traded goods by 1 percent would create gains of $40 billion globally and more gains would be distributed to developing countries.This is contrary to OECD (2002) survey that failed to clearly differentiate between direct and indirect transaction costs of the traded goods value. The study only suggests that transaction costs directly incurred in export and import procedures amount to 2-15 percent of the value of traded goods.

Bernard*et al.* (2006), for instance, examined the effects of trade costs changes on plant activities, export growth and productivity. The study used the 4-digit standard industrial classification level (SIC4) with a sample of 337 manufacturing industries. The results indicate that industries with relatively robust productivity growth are experiencing significant reduction in trade costs. It was also found that with reduction in trade costs, operations of low-productivity plants in the industries are likely to stop, while non-exporter with relatively high-productivity were more likely to begin exporting in response to decline in trade costs, as well as increasing shipments of existing exporters overseas.

Jacks*et al.* (2010) used a dataset covering 18 countries during the first wave of globalization in order to examine the levels, trade coststrends and its determinants during 1870-1913 period. Their findings reveal that with significant rise in tariffs and non-tariff barriers after 1870, there were no reduction in overall trade costs. Although, it appears to have declined by approximately 10-16 percent, despite reduction in shipping cost and as well removal of exchange rate uncertainty for many trading

partners. Finally, policies, proximity, infrastructure, and the British Empire account for over 50 percent differences in trade costs.

Lawless (2010) decomposed U.S exports into intensive and extensive margins of trade across 156 countries. His results reveal that U.S exports were affected by trade costs variables through their impact on the extensive margin. Also, regression estimates of the extensive margin have a better fit relative to intensive margins. Market size and proxies for communications infrastructure were the trade costs variables that had significant negative effects on the intensive margin. However, import cost barriers, language and internal geography all had significant effects on extensive margin.

Miroudot*et al.*(2012) examined services productivity and trade costs linkagesacross 61 OECD and EU countries.The authors considered 29 ISIC Rev.3 sectors together with 12 services sectors during 1995-2007period. Their findings show that more productiveservices sectors were faced with lower trade costs and consequently experienced productivity growth. However, in the goods markets, the result corresponds with models in which lower trade costs result to exit of less productive firms while resources are reallocated to more productive ones. Generally, their findings were economically and statistically significant such that reducing trade costs by 10 percent bring about 0.5 percent increase in total factor productivity (TFP). In a related study using the same dataset, data scope and sample size, Miroudot*et al.* (2013) measured international trade costs in services. The findings indicate that costs involved in services trade doubled or tripled those involved in merchandises sectors in some cases. The results further indicatethat despite regional groupingto promote a single market in services across EU, there was still a substantial difference in trade costs across countries.

Hummels and Schaur (2013) examined the modal choice decisions of firms to engage in trade using the trade-off between fast and expensive air transport against slow and low-cost ocean shipping to identify the value of time saving. The authors used US Imports of Merchandise database covering the period 1991–2005 and found that each day spent in transit equals to 0.6 to 2.1% of the value of the good. The likelihood of a country to successfully export a good is significantly determined by the extent of delay in transit. Also, the most time-sensitive trade flows involve parts and components trade. While analysing international trade flows with structural gravity models taking

heterogeneity and excess zeroes into consideration, Papalia and Bertarelli (2015) found that both the extensive and the intensive margins of trade are influenced by trade costs. Global trade barriers are captured by inward and outward multilateral resistance terms. Heterogeneous trade cost characteristics emerge across trade-integrated areas (such as APEC and EU) and across sectors are classified according to their technological content.

Among the developing countries, the crucial roles of trade costs in general have also been assessed. For instance, De (2007) examined how trade costs affect trade flows. The author used 4-digit HS data for 2004 across 10 Asian countries. The results reveal significant impact of infrastructural, transport costs and tariffson patterns of international trade. A 10 percent reduction in transport costsand tariffs would result to bilateral trade expansion by about 6 and 2 percents, respectively.Dennis and Shepherd (2007) used 8-digit mirror (import) data from EU to construct new export diversification measures for 118 developing countries. This was done to examine the relationship between export diversification and its potential determinants. Their findings reveal that reduction of either transport costs or cost to export by 1 percent was associated with 0.4 percent or 0.3 percent gainfrom export diversification. Also, diversification couldbe promoted through reduced entry costs in the domestic market.

With consideration to periods 1995-2008 and 2001-2007, Shepherd (2009) examined the role of trade facilitation towards reducing the overall trade costs across ASEAN and APEC.The results show that both groups experienced significant reduction in overall trade costs. This was associated with reduction in tariff. However, efforts towards reducing NTBs were limited, thereby suggesting that trade facilitation efforts of both groups should be refocused, particularly on NTBs. In a merchandise trade between the People's Republic of China (PRC) and India, Brooks and Ferrarini (2010) calculated trade costs declinefor the period 1980–2008. Their findings confirm that ever since 1980s, increasing share of trade growth between the two countries has been ascribed to significant decline in trade costs. Although, less than one third of trade growth during these periods was attributed to trade costs reduction relatively lower than three quarters during the 1990s and almost 85 percent during 2001–2008 period.

In a cross-border trade involving 105 developing countries including 26 African countries, Hoekman and Nicita (2011) compared the effect of border barriers (both

tariffsand non-tariff measures (NTMs)) with other trade costs elements. The findings reveal that while tariffs remain a key trade policy barrier in developing countries and for specific sectors(e.g. agriculture) in high-income countries, NTMs and DTCs were also of great importance. The findings further suggest that reducing costs associated with behind-the-border DTCs (captured by TFI: the LPI and the DB)could produce larger trade gains than additional reductions in tariffs, NTMs or seeking for trade preferences. Khan and Kalirajan (2011) examined how trade costs affect Pakistan's exportusing the two periods' trade data (i.e., 1999 and 2004). Their results thus reveal that significant increase in Pakistan's export during these periods was attributed to decline in trade costs arisen from implicit and explicit beyond the border in partner countries.

In a panel study comprising 178 developing countries, Arvis *et al.* (2013) examined the trade costs contributingfactors observed all over the world specifically onmanufactured and agricultural bilateral trade during 1995-2010 period. The analysis reveal logistics performance and maritime transport connectivity as key determining factors of bilateral trade costs and that the joint effect of these indicators correspond with geographical distance. Besides, other factors that substantially determine trade costs landscape comprises traditional and non-traditional trade policies,market entry barriers and regional integration agreements. Similarly, Arvis *et al.* (2015)extended the data scope from 1995 to 2012 with consideration to 167 developing countries. They found that low income and SSA countries were subjected to high trade costs. Therefore, regional integration agreements, trade facilitation performance and maritime transport connectivity were considered as key trade costs determinants.

Gaytarano*et al.* (2013) investigated how cost of trade affects exports of 28 transition countries for the period 2005-2011. Their findings show that country size and distance had significant impact on exports. Also that greater availability of natural resources impacts positively on exports of these transition countries. The results further reveal insignificant impact of export fees on exports from transition countries but a small negative impact on exports of countries not adjacent to any EU countries.Singh and Mathur (2014) exploredthe trade costs contributing factorscalculated for India and its 33 trading partners within Asian regionduring post liberalization (1991-2012) era.Their results show that except during the era of Asian financial crisis, trade costs between India and its Asian trading partners had declined greatly during the period under

consideration. Although, significant percent of these costs could not be explained by the highlighted determinants. There are other costs elements arisen from local distribution costs, NTBs and transportation costs among others, which may havea greater impact in determining the trade costs.

Ezzat (2015) analysed the effects of logistics on the competitiveness of non-oil exports from 15 of the Arab countries to Brazil for the period 2006-2013. The analysis indicate that the performance of the logistical activities worked as a barrier to trade as the sea distance proxied for transport costs had significant and negative elasticity. Also, index for documents to export as costs of regulatory complexity had negative and significant elasticity and the costs of the procedures to export per TEU had significant andnegative elasticity. Singh*et al.* (2015) investigated how trade costs affect bilateral trade flows among 31 Asian countries. Their findings confirm that the calculated trade costs and the available proxies had been richly linked with each other in the Asian continent. In addition, the signs of coefficients of these proxies were found consistent with the theory. Further, the estimation of gravity clarified that bilateral trade of Asia is highly sensitive to the incurred trade costs. To promote trade in Asia therefore, the current level of trade costs must be reduced.

Carballo, Schaur and Volpe-Martincus (2017) examined the interrelationships between trade facilitation policies, international trade and the transportation services sector using newly implemented transit trade system known as TIM (*Tránsito Internacional de Mercancías*/International Transit of Goods) that applies to road transit trade among Central American countries. The authors found significant effects of trade facilitation policy on the demand for transportation services. Also, both transit trade and the transportation section predict cost reducing effects on the provision of transportation services. Finally, the results show that TIM tends to increase total freight charges, but the evidence on freight rates is indirect. Moore (2018) provided a detailed review of both empirical and methodological approaches on the link between trade flows and frictions associated with transportation. Overall, the author found evidence of non-controversial results and that high transportation costs of various categories could generate significant effects on trade outcomes.

In a trade relation involving developed and developing countries, Francois and Manchin (2007) examinedhow infrastructure, institutional quality, colonial and

geographic context influenced bilateral trade patterns during the period 1988-2002. Their findings reveal that both export levels and likelihood of exporting were significantly determined by infrastructure efficiency and improved institutional quality.To examine the nexus between trade facilitation, transport costs and maritime trade forLatin America, Martinez-Zarzoso*et al.* (2007) used sectoral exports of 181 countries to 9 Latin American countries during 2000-2006 period. Their findings show that time delays significantly increase freight rates and that natural trade barriers (transport costs) were more important than institutional trade barriers (trade facilitation factors) for Latin American trade.

Using export shares of 158 manufacturing industries across 71 countries between 1972 and 1992, Greenaway*et al.* (2009)investigated how differences in overall country-specific trade costsaffect comparative advantage and commodity composition of trade. It was found that trade costs represent country's endowment through which export composition and pattern of comparative advantage were affected. This was reflected in export performance at the industry level. Therefore, countries with reduced trade costs tend to export more of thecommodities which costs were more imperative, having controlled for influences of both physical and human capital endowment on export performance. Thangavelu (2010) examined NTBs effect on export growth and ASEAN regional integration. The result shows that declines in NTBs significantly have positive effect on ASEANtrade performance.

In an attempt to identify trade facilitation policy priorities for 64 countries in 2006, Duval and Utoktham (2011b) evaluated the relative importance of trade costs reduction through policy-related and other factors. The analysis show occurrence of high trade costs between India and Mekong countries relative to what prevail among Mekong countries. Although, between India-Mekong countries, progress were made towards reducing trade costs than with developed countries (for example, Japan and the U.S). This was an indication of significant improvement in regional connectivity. The analyses therefore suggest policies prioritization towardsimproving maritime and ICT services which are essential for decline in trade costs.

While quantifying and comparing the relative impact ofTF and trade policy barriers on bilateral trade flows, Márquez-Ramos, Martínez-Zarzoso and Suárez-Burguet (2012) used a sample of 167 importers and 13 exportersacross countries in year 2000. Their

findings show thatinternational trade could be promoted to a greater height through significant reduction in the doing business requirements (i.e., documents and time required) and information technology achievement rather than equivalent reductions in tariff barriers.Similar resultswere obtained both at sectoral and aggregate levels. The study thereby suggests that TF processes should essentially be the forefront for multilateral negotiations.

Milner and McGowan (2013) found that export share of countries with lower trade costs is higher in industries with high trade cost intensities. Also, countries with low trade cost have comparative advantage in exporting goods that are more sensitive to changes in trade costs. In an attempt to appraise the evolution of gravity model of international trade both on theoretical development and the challenges associated with various estimation issues, Baier, Kerr and Yotov (2017) constructed a counterfactual vector of bilateral trade costs. The authors simulated the general equilibrium impact of a bilateral free trade agreement between UK and US, and found that US exports is estimated to increase by over 1%, but not as high as Great Britain which was around around 2.5%. In another scenario without globalization, the authors employed partial equilibrium approach and found significant reduction between 60-70% in the exports of smaller and poorer countries such as Nigeria (67%), Senegal (67%), Iran (66%), Kenya (66%), and Qatar (63%). Although, countries whose exports would have suffered the least (but still significantly) include China (25%), Ireland (27%), Japan (32%), Singapore (32%), and Malaysia (33%).

In Sub-Saharan African countries, Lyakurwa (2007) overviewed the difficulties facing the African exporters in terms of high transaction costs and concluded that poor state of infrastructure, unconducive regulatory environment and lower returns on investment are the major factors that discouraged exporters virtually in Africa. While reviewing the role of government in terms of liberating the constraints facing export supply in Africa, Bacchetta (2007) pointed out that both policy-makers and development specialists required comprehensive understanding of how Africa's export could be increased through existence of improved business environment.

Following the argument that Africa had higher trade costs than other regions, Portugal-Perez and Wilson (2008) used a dataset covering 115 exporters and 104 importers together with 22 African countries to explore the impact of trade costs on African

countries. Their findings advocate thatreducing costs associated withimprovements in logistics could enable both less and more advanced African countries in the region to compete favourably for higher trade growth than continuous fall in tariffs.While examining the significant role of trade costs in economic development of Africa, Portugal-Perez and Wilson (2009) suggest that 50 percent improvements in trade logistics to the level in South Africa could yield greater gains for African exporters than a substantive decline in tariff barriers.

Ackah*et al.* (2012) explored the impact of trade logistics and facilitationmeasures on bilateral exports using 10 ECOWAS countries during 2007-2009period. Their findings revealthat logistics impact positively on bilateral exports.Also, logistics had larger impact on bilateral exports frommembers than in the destination countries. In addition, six of the overall LPI indicators were considered key factors determining ECOWAS bilateral exports (both within and outside).Also, for bilateral trade within ECOWAS, customs efficiency among these indicators had the greatest impact. However, logistics competence had the least impact.

Adewuyi and Bankole (2012) examined the possiblegains and losses associated with trade agreements between Nigeria and China. Their results reveal thatmutual tariff reduction by equal magnitude would increase bilateral exports of both countries. In the simulation results, Nigeria would record export growthwith a non-reciprocal tariff reduction in Chinaby 25 percent, 50 percent, 75 percent and 100 percent, respectively in all traded products. Equally, mutual reduction in tariff betweenthem, by equal magnitude wouldraise Nigeria'sexports of mineral fuels, some manufactured products and chemicals by more than 100 percent. On the other hand, China's exports to Nigeria would increase by 32 percent and 43 percent (for miscellaneous manufactures and crude materials).While assessing the trade flows linkages and identifying cross-border trade barriers between Cameroon and Nigeria, Hoppe*et al.* (2013) found that regulatory procedures and security barriers at the border and along the road are the major trade barriers.

Results of previous studies that combined two or more indicators of trade costs generally revealed evidence of inverse relationship and significant impact. Some of these studies (Brooks & Ferrarini, 2010; Khan & Kalirajan, 2011; Ackah *et al.,* 2012; Adewuyi & Bankole, 2012 and Singh *et al.,* 2015) combined trade policy barriers

measures together with trade-related infrastructure measures. Studies like Duval and Utoktham (2011b), Hoekman and Nicita (2011) and Márquez-Ramos*et al.* (2012), combined trade policy barriers measures together with border-related (domestic regulatory) measures, while Martinez-Zarzoso*et al.* (2007), Ezzat (2015) combined border-related and trade-related infrastructure measures. Also, Francois and Manchin (2007) and Greenaway*et al.*(2009), combined trade-related infrastructure together with institutional quality measures. Most of these studies conducted for developed countries used aggregated trade datawithin panel framework except, Bernard*et al.*(2006) that used sectoral trade data. In terms of methodology adopted, Jacks*et al.*(2010) employed micro-founded gravity model while Lawless (2010), Adewuyi and Bankole (2012)and Hoppe*et al.* (2013) employed gravity model. Bernard*et al.* (2006) and Miroudot*et al.*(2012) employed survey method and econometric approach. For those studies conducted basically for developing countries including Sub-Saharan Africa, aggregated trade data were used and most employed gravity model with the exception of Dennis and Shepherd (2007) and Singh and Mathur (2014) that adopted non-parametric model and econometric approach, respectively. Finally, among the studies conducted for developed and developing countries, aggregated trade data were used except Greenaway*et al.* (2009) that used sectoral trade data. Also, the studies employed gravity model except Duval and Utoktham (2011b) that employed econometric approach.

2.8.6 Gaps in the Existing Literature

Studies on trade costs have remained inconclusive as there are various theoretical, methodological and empirical gaps identified which serve as motivation for the study. First, some theoretical issues based on their underlying assumptionsare flawed. For instance, the traditional trade models failed to bring trade costs explicitly into their analysis. However, the concept of trade costs was introduced by Samuelson (1952) in which emphasis was placed on iceberg transport costs without given consideration to other sub-components of trade costs such as tariffs. Also,the neo-classical trade theory assumed that firms are homogeneous. But to capture the heterogeneity of firms in terms of productivity, export and size, heterogeneous firm trade model emerged. This is contrary to the new trade theory (NTT) by Krugman (1979, 1980) that used industry as a unit of analysis rather than firm. In which case, NTT found it difficult to explain

asymmetries issues across firms.Melitz (2003) and Chaney (2008) in their heterogeneous firms' trade theory (HFTT) explicitly analysed the issue of trade costs explaining that exporting firms, apart from facing fixed production costs, are also required to incur initial entry costs, i.e., sunk costs and variable trade costs in addition. However, HFTT is mostly suitable for analysing firm-level exports without any consideration for country level analysis. Since the present study is based on country-level analysis using aggregate trade data, the standard H-O model derived from neo-classical trade theory is modified and adopted to account for trade costs components-ITCs and DTCs.

Having reviewed the various measures of trade costs and the most adopted methods of analysis, still there are gaps from the methodological side. Previous studies have utilized the available methods for analyzing the impact of trade costs on trade flows. Such methods include: gravity model/econometric approach andCGE model. This study employs gravity model because it is the most standard empirical tools for modelling bilateral trade flows. The gravity equation is estimated within the framework of panel instrumental variables (IV)estimator, specifically pooled two-stage least squares (2SLS) technique, leveraging on fixed effect and random effect, in conjunction with PPML and fixed effect PPML.

With respect to the indicators for measuring trade costs, different indicators have been adopted by different studies, although depending on the peculiarity of the economy or region under study. Trade policy barrier, trade related infrastructure barrier, border-related (domestic regulatory barrier) measured by doing business index (DBI) and LPI, and quality of institutions (measured by corruption and transparency) have all been used. This study considers the combination of the above mentioned four measures of trade costs identified in the literature because each reflects the peculiarity of the Nigerian economy and to be able to disaggregate the impact of each component on Nigeria's trade flows.

Lastly, gaps in the empirical literature confirm that trade costs significantly impede trade flows. Therefore, this study is premised to investigate empirically if the modifications made in the theory, which is the inclusion of both ITCs and DTCs into the H-O model, are important in understanding the trade costs impact on Nigeria's trade flows. Also, the study investigates the differential impact of the two components

of trade costs mentioned above and which one has more devastated impact on Nigeria's trade flows.

CHAPTER THREE

THEORETICAL FRAMEWORK AND METHODOLOGY

3.0 Introduction

This chapter discusses the theoretical framework and the methodology employed in this study. This chapter is sub-divided into two sections. Section 3.1 concentrates on a step by step derivation of the theoretical framework, while section 3.2 focuses on the methodology to be adopted for the study.

3.1 Theoretical Framework

In chapter two, several trade theories were reviewed, to include the traditional trade theories (classical and neo-classical trade theories), new,and new-new trade theories. Among these bodies of theories, the neo-classical trade theory from which the H-O model is derived is found suitable for the study. In the following subsections, the H-O model is modified to incorporate the trade costscomponent as a determinant of trade flows.

3.1.1 Model Description

This thesis developed a trade model following Sadikov(2007) which has roots in the specific factors model. The model used for the present study, however, differs from Sadikov (2007)by utilizing H-O assumptions rather than those under specific factorsmodel which form the basis of Sadikov (2007). According to H-O model, conditions of supply alone determine the pattern of international trade. Each country export commodity which supply of its factor is relatively abundant and price is relatively cheap while import commodity whose supply of its factor is relatively scarce and price is relatively dear(Feenstra, 2004). H-O model is relevant for the case of Nigeria that exports primary products, which uses the relatively abundant resources intensively, and import manufactured products. For the case of this study, the modified H-O assumptions are as follows:

Two countries exist in the world, Home (H) and foreign (F). Two commodities (primary and manufacture commodities) are produced. H-country produces and export primary product (homogenous in nature) while F-country produces and export manufactured products which is assumed to be heterogeneous. Two factors of production (labour L and capital K) are perfectly inelastic and are required in the production of each of these commodities and are internationally mobile. International trade is very costly. This is to show that assumption of free and absence of trade impediments assumed by H-O model is relaxed. In real sense, there is no free trade in the world as trading countries bear a plethora of trade costs, such as tariffs, non-tariffs, documentation, transportation, and border delays.

The Trade Model

According to Sadikov (2007), each country is endowed with composite factor *L* and a specific factor (i.e., skilled labour), which is required for a country that produces and exports manufactured products. In the case of this study, we assume two factor inputs (i.e., labour and capital), which is persistence with H-O model. This is due to the fact that Nigeria is a primary products producer which may not require specific factor. A representative consumer in country *i* maximizes preferences over two composite goods: primary product (homogeneous) good *H* and manufacture product (heterogeneous) good *D*.

$$U_i = D_i^{\alpha} H_i^{1-\alpha} \tag{3.1}$$

Where α isthe share of consumer's income spent on *D*. *D* represents sub-utility derived from the consumption of manufacturing goods, while *H*signifies sub-utility derived from the consumption of primary goods.

It is assumed that aggregate exports of all firms in a country constitute total export of a country. Perfect competitive firms in each country produce an identical commodity using labour input, *L*. The production takes a form of constant returns to scale technology with marginal cost c_{ih}in country *i*. Each country produces a unique commodity. Aggregation of consumer preferences for primary goods (both imported and domestic goods) is given by the standard constant elasticity of substitution

(CES)utility function. Between the two commodities, the elasticity of substitution is characterized by $\sigma_h > 1.$

$$H_i = \left(h_{ii}^{\frac{\sigma_h - 1}{\sigma_h}} + h_{ij}^{\frac{\sigma_h - 1}{\sigma_h}} \right)^{\frac{\sigma_h - 1}{\sigma_h}} \tag{3.2}$$

Where h_{ii} and h_{ij} signify consumption by consumer in country *i* of homogenousgoods producedin country *i* and *j*, respectively.

In a manufacturing sector, symmetric but imperfect substitutable goods are produced by firms in the usual Dixit-Stiglitz approach.Each firm uses increasing returns to scale technology with constant marginal cost to produce a single variety of commodity. Manufacturing good produced requires the composite labour input *L*, with constant marginal cost c_{id} in *i*. Assuming the consumption in *i* of manufacturing good produced in *j* is denoted by d_{ij}. A symmetric CES aggregate of consumer preferences for the manufactured good (both imported and domestic goods) is also given by:

$$D_i = \left(N_i d_{ii}^{\frac{\sigma_d - 1}{\sigma_d}} + N_i d_{ij}^{\frac{\sigma_d - 1}{\sigma_d}} \right)^{\frac{\sigma_d}{\sigma_d - 1}} \tag{3.3}$$

Where $\sigma_d \geq 1$ symbolizes elasticity of substitution between varieties of manufactured goods.Based on these assumptions, mark-up profits will be generatedby firms, in equilibrium, and will be accrued to the owners of specific factor *S*.

Trade Costs

In this present study, it is assumed that trade costs take an ad valorem form. In such case,importer in country *i*faces price $p_j\left(1+t_{ij}\right)$ for shipping good from country *j* at price $p_{j.}$

$$\text{i.e. } p_i = p_j\left(1+t_{ij}\right) \tag{3.4}$$

Hence, trade costs are regarded to as TTCs because both exporter and importer are affected. For the importing country, TTCs are not limited to shipping costs but also other costs such as ITCs and DTCs. The former comprises tariffs, non-tariff and exchange rate.The latterconsists of documentation, institutional inefficiencies, infrastructural deficiency and stringencies in home country. For exporting country, costs incurred include transportation costs for moving good from a factory gate to the port, tariffs, infrastructural and institutional inefficiencies, number of documentation required, number of days to process the document and cost of moving a container from country *i* to *j*. Generally, potential trade relations between or among the trading partners is determined by the degree of export and import transaction costs required by both exporting and importing countries. An indication of high costs of trading is when export transaction costs for exporting country is low but import transaction costs for importing country is high.

In this framework, to model the impact of TTCs on trade flows generally, we assume that TTCs for each bilateral country can be expressed as:

$$\tau_{ij} = Er_{ij}\left(1 + t_{ij}\right) + d_x \qquad (3.5)$$

Where τ_{ij} is the total costs of trading between two countries; Er_{ij}signifies nominal exchange rate between two countries; $1+t_{ij}$ denotes cost of transporting goods from country *i to j,*which is equivalent to one plus tariff rate applied to the goods. d_x represents domestic trade costs incurred. The two commodities (primary and manufactured goods) can be traded following the trade costs function given by equation (3.5).

Import Demand Function

In product markets, perfect competition suggests that firms always price at marginal cost.Domestic price $\left(p_i\right)$is equivalent to marginal cost of production $\left(c_i\right)$, while the import price $\left(p_{ij}\right)$ is higher due to trade costs $\left(\tau_{ij}\right)$. TTCs is made up of tariff on

imports and domestic trade costs $\left(d_x\right)$. Expressing tariff on import in domestic currency value is given as $Er_{ij}\left(1+t_{ij}\right)$.

Hence, price of domestic and imported goodsfaced by consumer in country*i* is:

$$p_{iih}=c_{ih} \qquad \text{for domestic goods, and}$$

$$p_{ijh}=c_{jh}\left(\tau_{ijh}\right) \qquad \text{for imported goods.}$$

Consumer in country *i* spends $1-\alpha$ share of her total income, *T*, on homogeneous good. Solving the consumer's maximization problem gives a commodity demand function; the import demand for commodity produced in *j* is:

$$h_{ij}=p_{ijh}^{-\sigma_h}g_{ih}^{(\sigma_h-1)}\left(1-\alpha\right)T \tag{3.6}$$

Where $g_{ih}=\left(\sum_{j=1,2}p_{ijh}^{1-\sigma_h}\right)^{\frac{1}{1-\sigma_h}}$ represents ideal commodity price index in country *i.* The

total value of country *i's* commodity imports from country *j* is thereby determined by multiplying imported price (constituted by marginal cost of producing the good in the foreign country and TTCs), ideal commodity price index in country *i* and proportion of total income of consumer in country *i.* This is therefore expressed in equation (3.7).

$$M_{ijh}=c_{jh}^{1-\sigma_h}\left(\tau_{ijh}\right)^{1-\sigma_h}g_{ih}^{\sigma_h-1}\left(1-\alpha\right)T_i. \tag{3.7}$$

For each firm in the manufacturing industry, different variety of a particular product demanded in the world is produced.A demand curve faced by profit maximizing firms has a constant elasticity, and hencesetting price at a constant mark-up above marginal cost. Given these situations, commodity price faced by consumer in country *i* is:

$$p_{iid}=\frac{\sigma_d}{\sigma_d-1}c_{id} \qquad \text{for the domestic goods, and} \tag{3.8}$$

$$p_{ijd}=\frac{\sigma_d}{\sigma_d-1}c_{jd}\left(\tau_{ijd}\right) \qquad \text{for the imported goods.} \tag{3.9}$$

Solving consumer problem for country *i*'s imports value in each of N_j (i.e., number of manufacturing varieties), the total value of manufactured goods country *i*imports from *j*is given by:

$$M_{ijd} = N_j c_{jd}^{1-\sigma_d} \left(\tau_{ijd}\right)^{1-\sigma_d} g_{id}^{\sigma_d - 1} \alpha T_i. \tag{3.10}$$

TTCs constituted by ITCs and DTCs constrain trading activities regardless of the destination of the commodity. ITCs for instance, depreciation of local currency against the hard currency increase the production costs in the home country. Cost of importing raw materials and machinery are high and thus making price of imported goods higher. Also, DTCs, which can be captured by high documentation, weak institution and inefficient infrastructure increase the costs of production of the firms and consequently translate to higher price (both at home and foreign markets). To model the impact of these costs, we assume that reduction in TTCs increase the trade performance of a country. This can therefore be achieved using a country-cost efficiency parameter *a* (with higher values indicating reduction in TTCs). Since production require two factor inputs (i.e., L and K), labour is assumed to be sourced cheaply in the home country while capital, which constitute fixed costs and mostly required in any production process, is sourced abroad. Costs of setting up a business as well asmarginal cost of production would reduce with significant reduction in TTCs. But for commodities whose production requires no fixed costs, it is implied that only labour *L* input is involved in their production and that an increase in productivity lowers marginal costs. Based on this, the marginal cost for each firm in the industry becomes $\frac{c_j}{a_j}$.

Export Supply Function

With perfect competition of the productsector and monopolistic competition with constant mark-ups in manufacturing sector, commodity prices in the two markets reduces due to lower marginal costs. Particularly, in manufacturing industry, reductions in TTCs enhance firms' productivity and this allows a country to produce and export more varieties of goods. Country *j*'s exports of homogeneous and heterogeneous commodities to country *i*is expressed as:

$$E_{ijh} = \left(\frac{c_{jh}}{a_j}\right)^{1-\sigma_h} \left(\tau_{ijh}\right)^{1-\sigma_h} g_{ih}^{\sigma_h - 1}\left(1-\alpha\right)T_i \tag{3.11}$$

$$E_{ijd} = \left(N_j a_j\right)\left(\frac{c_{jd}}{a_j}\right)^{1-\sigma_d} \left(\tau_{ijd}\right)^{1-\sigma_d} g_{id}^{\sigma_d - 1}\alpha T_i. \tag{3.12}$$

Equation(3.7), (3.10), (3.11) and (3.12)show that reduction in TTCs will have more prominent impact on bilateral exports and imports of home and foreign countries both intensively and extensively.

3.2 Methodology

This section discusses the tools and techniques that are used in analysing the impact of trade costs on trade flows. Also, all the variables and data used in the analysis are described in this section.

3.2.1 Model Specification

Gravity model is an approach used to explore the impact of trade costs on bilateral trade flows among the trading partners. Gravity model is one of the popular partial equilibrium models recognised in explaining trade flows variation. It provides the main relationship between trade costs and trade flows. Bilateral trade flows is described as a function of market sizes of trading partners and their bilateral trade barriers. Market size, on the otherhand, is mostly used as a measure of GDP.In international trade literature, gravity model is often usedas a veritable tool to analyse a functional relationship between and among countries and their trading partners.Examples of studies in this category include the work of Bankole*et al.* (2012), Deen-Swarray*et al.* (2012) and Adewuyi and Bankole(2012).

Following from equation 3.10 and 3.11, this thesis examines the impact of trade costs on trade flowsbetween Nigeria and its major trading partners by specifying a modified standard gravity model as:

$$\ln \exp_{ijzt} = \beta_0 + \beta_1 \ln y_{it} y_{jt} + \beta_2 trf_{ijt} + \beta_3 reer_{ijt} + \beta_4 rot_{it} + \beta_5 mat_{it} + \beta_6 inq_{it} + \beta_7 ndrx_{it} + \beta_8 ndpx_{it} + \beta_9 \ln \cos x_{it} + \varepsilon_t \tag{3.13}$$

$$\ln imp_{ijzt} = \beta_0 + \beta_1 \ln y_{it} y_{jt} + \beta_2 trf_{ijt} + \beta_3 reer_{ijt} + \beta_4 rot_{jt} + \beta_5 mat_{jt} + \beta_6 inq_{jt} + \beta_7 ndrm_{jt} + \beta_8 ndpm_{jt} + \beta_9 \ln \cos m_{jt} + \varepsilon_t \quad (3.14)$$

To control multilateral resistance to trade, Anderson and van Wincoop (2003) suggested that, in a gravity specification, bilateral countries should include exporter and importer specific effects.This approach is to allow for country-specific nature of the export and import transaction costs (Baier & Bergstrand, 2001). This therefore captures the multilateral resistance effects as well as heterogeneity effects.

$$\ln \exp_{ijzt} = \beta_0 + \beta_1 \ln y_{it} + \beta_2 \ln y_{jt} + \beta_3 trf_{ijt} + \beta_4 reer_{it} + \beta_5 reer_{jt} + \beta_6 rot_{it} + \beta_7 rot_{jt} + \beta_8 mat_{it} + \beta_9 mat_{jt} + \beta_{10} inq_{it} + \beta_{11} inq_{jt} + \beta_{12} ndrx_{it} + \beta_{13} ndrm_{jt} + \beta_{14} ndpx_{it} + \beta_{15} ndpm_{jt} + \beta_{16} \ln \cos x_{it} + \beta_{17} \ln \cos m_{jt} + \varepsilon_t \quad (3.15)$$

$$\ln imp_{ijzt} = \beta_0 + \beta_1 \ln y_{jt} + \beta_2 \ln y_{it} + \beta_3 trf_{ijt} + \beta_4 reer_{jt} + \beta_5 reer_{it} + \beta_6 rot_{jt} + \beta_7 rot_{it} + \beta_8 mat_{jt} + \beta_9 mat_{it} + \beta_{10} inq_{jt} + \beta_{11} inq_{it} + \beta_{12} ndrm_{jt} + \beta_{13} ndrx_{it} + \beta_{14} ndpm_{jt} + \beta_{15} ndpx_{it} + \beta_{16} \ln \cos m_{jt} + \beta_{17} \ln \cos x_{it} + \varepsilon_t \quad (3.16)$$

Where z equals total trade and sectoral trade (various sectors), *i* indexes countries and *t* denotes time.The dependent variable $\left(\exp_{ijztd}\right)$in equation (3.15) represents exports of commodity *z* from country *i* (Nigeria) to country *j* (each of the major trading partners) at year *t* on a one –digit division *d*. Thedependent variable $\left(imp_{ijztd}\right)$in equation (3.16) is imports of country *i* (Nigeria) ofcommodity *z*from country *j* (each of its major trading partners). The one-digit division separates both export and import flows into 10 categories such as "0-Food and live animals"; "1-Beverages and tobacco"; "2- Crude materials, inedible, except fuels"; "3- Mineral fuels, lubricants and related materials"; "4- Animal and vegetable oils, fats and waxes"; "5- Chemicals and related products"; "6-Manufactured goods classified chiefly by material"; "7- Machinery and transport equipment"; "8- Miscellaneous manufactured articles"; "9- Commodities and transactions not elsewhere classified". The export volumes of both exporting and importing countriesare explained by their GDP denoted as:

y_{it} is Nigeria's GDP at market prices (constant 2010 US$)at time *t*,

y_{jt} represents the GDP at market prices for each of Nigeria's major trading partners (constant 2010 US$)

exp_{ijt} representsNigeria's real exports value to each of its major trading partners at time *t.*

imp_{ijt} represents Nigeria's real imports value from each of its major trading partners at time *t.*

trf_{ijt} isbilateral weighted average level applied MFN tariffs rates at time *t.*

$reer_{it}$ and $reer_{jt}$ denote real effective exchange ratefor both exporting and importing countries at time *t.*

rot_{it} and rot_{jt} representratio of total roads network to total populationfor both exporting and importing countries at time *t*.

mat_{it} and mat_{jt} represent liner shipping connectivity index for both exporting and importing countries at time *t*.

inq_{it} and inq_{jt} representinstitutional qualityfor both exporting and importing countries at time *t*.

$ndrx_{it}$ and $ndrm_{jt}$ denoterequired number of documents to exports and imports at time *t.*

$ndpx_{it}$ and $ndpm_{jt}$ denote required number of days to complete exports and imports processes attime *t.*

$cosx_{it}$and $cosm_{jt}$ are the costs required to exports and imports at time *t.*

ε_t represents error term at time *t*.

Table 3.1: A priori Expectation of the Variables used in equations (3.13) and (3.14)

Abbreviation of Variables	Explanation of Variables	Measurement	Expected relationship (sign)	Data source
EXP	Export	Trade value of export in 1000 USD		WITS
IMP	Import	Trade value of import in 1000 USD		WITS
GDP	Gross Domestic Product	GDP at market prices (constant 2010 US$).	+	WDI
TRF	Tariff	Bilateral weighted average level applied MFN tariffs rates (%)	-	WDI, World bank database. https://data.worldbank.org/indicator/TM.TAX.TCOM.SM.AR.ZS
REER	Real Effective Exchange rate	Real effective exchange rate index (2010=100)	-	Global Economic Monitor (GEM) and UNCTAD
ROT	Roads Transport	Ratio of total roads network to total population.	+/-	Computed from WDI; National Planning Commission and Road Statistics Yearbook; https://www.cia.gov/library/publications/the-world-factbook/fields/2085.html
MAT	Maritime Transport	Liner shipping connectivity index (LSCI)	+/-	UNCTADstat
INQ	Institutional quality	Average value of the four elements (control of corruption,regulatory quality,political stability and absence of violence/terrorism, and rule of law) in the Worldwide Governance Indicators	+/-	To be computed from data available in WGI
NDRX	Required number of documents to exports	All documents required per shipment to export goods (number)	-	WDI
NDPX	Time to export (days)	Required number of days to completeexport processes	-	WDI
NDRM	Required number of documents to imports	All documents required per shipment to import goods (number)	-	WDI
NDPM	Time to import (days)	Required number of days to complete import processes	-	WDI
COSX	cost to export (US$ per container)	Cost to export a 20-foot container in US$	-	WDI
COSM	cost to import (US$ per container)	Cost to import a 20-foot container in US$	-	WDI

Source: Author's Compilation from Literature Review.

All the variables and the a-priori expectation are as earlier defined and μ_t is the white noise disturbance error term.

3.2.2 Estimation Issues

Ordinary Least Squares (OLS) technique could be used to estimate equation (3.15) and (3.16).Although estimating pooled OLS tends to give better and more efficient estimates than performing individual OLS on repeated cross-sections. However, using OLS to estimate equation (3.15) and (3.16) may raise several issues as it could not account for potential endogeneity of the explanatory variables (possible reverse causality) between exports/imports value and real gross domestic product (RGDP). To correct for endogeneity issue mentioned above, the use of any of GMM, SUR, GLS estimators is suitable provided the available data has longer time series with longer cross-section.

None of these techniques is also suitable due to available short-time data series even though the study involved more cross-sections.More so, since dependent variable in the model does not range between 0 and 1, the use of binary choice model (such as probit, tobit and logit) which are designed for such situation cannot be applied in this study.To account for country specific effect and control for unobserved heterogeneity, panel fixed effects and random effects are mostly used.

However, endogeneity problem was suspected in the models specified which could not be corrected with either of them. Lastly, despite the fact that heterogeneous panel data (HPD) analysis is used to solve the problems of heteroscedasticity, endogeneity and country specific effects. Still, it is not suitable because it requires longer time series data with longer cross-sections.

3.2.3 Estimation Technique

The thesisexplores the impact of trade costs on bilateral trade flowsbetween Nigeria and its major trading partners with the aid of modified standard gravity model. In doing this, equation (3.15) and (3.16) were estimated using panel instrumental variables (IV)estimator, precisely pooled 2SLS technique. A rationale for this technique is that it is designed for few time periods and longer cross-sections. To achieve this objective, two different methodswere applied. As a starting exercise, the study established the need to estimate IV-2SLS by first using the standard OLS method and then test for endogeneity. When this is suspected, it implies that OLS assumption is violated. This therefore required estimating pooled 2SLS and then test for heterogeneity using F-test while performing Hausman testto determine the most

suitable between fixed effect 2SLS and random effect 2SLS. These approaches were used to analyse aggregate and sectoral trade (agriculture and manufacturing sectors) for both exports and imports models. However, PPML and fixed effects PPML were only used for extractive sector (both exports and imports). The models for both aggregate and sectoral exports and imports trade were estimated in two versions. The first version estimates the models for period 2005-2016 (i.e., the full period). In the second version of estimations, pair-wise period (sub-period) estimations were carried out with consideration on the period before trade facilitation agreement (period 2005-2013). Estimations were not carried out for the period during TFA due to short period of time (i.e., 2014-2016). Also, there is problem of little real time series variation as the available data are constant over time, especially the doing business indicators. Estimating such models result to omission of some of the variables in the model because of collinearity. To avoid singular matrix as well, estimations were only done for the period 2005-2016 (full period) and pre-TFA period (2005-2013). The reason for splitting the sample period is to be able to assess the differing impact of each trade costs component on bilateral trade flows for each period.

According to Hsiao (1986), since there is possibility of bi-directional causality between the endogenous and right hand sidevariables,there may be correlation between regressorsand error term. Based on this, OLS estimates become biased and inconsistent as the underlying assumptions are violated.In a cross-country analysis, endogeneity is a common issue that could be traced to variable omission and measurement errors, other than reverse causality (i.e., simultaneity).Omitted variables occur as a result of non-inclusion of some relevant variables in the model. If omitted variable is correlated with the other regressors, then the subsequent estimated parameters will be inconsistent and biased. Even if omitted variable is not correlated with other regressors, the intercept term will be biased and the parameter estimates will be inefficient. Measurement errors on the other hands occur mainly due to wrong measures of explanatory variables in the model. Theoretically, there is potential endogeneity problem between exports/imports and GDP which relates to measurement error.

There are three approaches to work around endogeneity issue. One of these approaches is to include country specific effects.This helps to determine the most suitable empirical model for estimating trade flows. Hausman test is used to determine the best

specification between fixed and random effects model. However, this approach is not a perfect solution.It only eliminates endogeneity caused by omitted variables. An alternative approach to address endogeneity problem involveschoosing a set of instrumental variables (IV) for each potentially endogenous variable.However, finding instruments that perform well is difficult as weak instruments tend to generate other problems (Wooldridge, 2012).More importantly, when there is simultaneity problem (i.e., reverse causality) in a model, in which choosing a good instrument is difficult, an alternative solution to such issue is to use atime-lagged versions of the potentially endogenous variable (Bacchetta *et al.,*2012). This serves as a natural source of instruments in terms of predetermined variables (Wooldridge, 2012). However, it is worth noting that lagging a variable reduces the years for which such variable is included in the series.This is problematic as time-series variation is short. Given this scenario, equation (3.15) and (3.16) can be rewritten as:

$$\begin{aligned}\ln \exp_{ijzt} &= \beta_0 + \beta_1 \ln \exp_{ijz,t-1} + \beta_2 \ln y_{it} + \beta_3 \ln y_{jt} + \beta_4 trf_{ijt} + \beta_5 reer_{it} + \beta_6 reer_{jt} + \beta_7 rot_{it} + \beta_8 rot_{jt} \\ &+ \beta_9 mat_{it} + \beta_{10} mat_{jt} + \beta_{11} inq_{it} + \beta_{12} inq_{jt} + \beta_{13} ndrx_{it} + \beta_{14} ndrm_{jt} + \beta_{15} ndpx_{it} + \beta_{16} ndpm_{jt} \\ &+ \beta_{17} \ln \cos x_{it} + \beta_{18} \ln \cos m_{jt} + \varepsilon_t \end{aligned} \quad (3.17)$$

$$\begin{aligned}\ln imp_{ijzt} &= \beta_0 + \beta_1 \ln imp_{ijz,t-1} + \beta_2 \ln y_{jt} + \beta_3 \ln y_{it} + \beta_4 trf_{ijt} + \beta_5 reer_{jt} + \beta_6 reer_{it} + \beta_7 rot_{jt} + \beta_8 rot_{it} \\ &+ \beta_9 mat_{jt} + \beta_{10} mat_{it} + \beta_{11} inq_{jt} + \beta_{12} inq_{it} + \beta_{13} ndrm_{jt} + \beta_{14} ndrx_{it} + \beta_{15} ndpm_{jt} + \beta_{16} ndpx_{it} \\ &+ \beta_{17} \ln \cos m_{jt} + \beta_{18} \ln \cos x_{it} + \varepsilon_t \end{aligned} \quad (3.18)$$

3.2.4 Estimation Procedures

In carrying out the estimations, five different estimators were used for comparison purpose. These estimators include: Pooled two-stage least square (2SLS), fixed effects (FE) model, random effects (RE) model, Poisson Pseudo-Maximum Likelihood (PPML) and fixed effects PPML. The first three estimators were used to analyse aggregate trade and sectoral trade (agriculture, manufacturing sectors) for both exports and imports models. The fourth and fifth estimators (i.e., PPML and fixed effects PPML) were only used for extractive sector (both exports and imports). The rationale behind the use of PPML and fixed effects PPML is to avoid the dropping of zero trade

flows present in the extractive sector data set for both exports and imports. When using PPML and fixed effects PPML estimators, the dependent variable (exports or imports) must be expressed in levels rather than in logarithms form as the log of 0 is undefined. Nevertheless, any or all the explanatory variables in the same model can be in logarithms form.

In the aggregate and other sectoral models, dependent variable in each was logged because there is absence of zero trade while GDP of exporting and importing countries and cost to export and import a container (US$) are the explanatory variables logged in each model for pre-TFA period analysis. However, only GDP of exporting and importing countries are logged for the full period analysis. This is as a result of zero cost to export and import a 20-foot container recorded by some European Union (EU) countries after the TFA is implemented.

In the process of estimating the models, two important econometric issues cropped up: endogeneity and multicollinearity issues. Multicollinearity among the explanatory variables was detected using correlation analysis. In order to avoid both multicollinearity and insufficient degree of freedom that could result from inclusion of too many variables in a single model, the model was partitioned into two (i.e., models 1 and 2)[27]. More so, endogeneity test was conducted by the process of estimating separate OLS for each of the partitioned models through which OLS residual was generated. Then, a Durbin-Wu test was performed in order to identify the potentially endogenous variable(s) in each of the partitioned models. This is done by correlating the OLS residual with all the respective explanatory variables in each model.

Over-identification test was performed using Hansen-Sargan over-identification test with the null hypothesis of over-identifying restriction to confirm the validity of the instruments used while estimating pooled 2SLS. Before selecting the appropriate method among the first three estimators mentioned above, F and Hausman tests were performed. F-test was used to test for heterogeneity and was significant in all models while Hausman test was conducted to confirm the most suitable out of the fixed or random effects models. The null hypothesis (H_0) guiding the Hausman test is stated as: difference in coefficients not systematic. Accepting or rejecting the null hypothesis

[27]There is low degree of freedom due to short period, limited observation together with too many variables in a model. Given this scenario, some of the variables in the model are omitted from the analysis which therefore prompted partitioning the model into two.

depends whether probability value (prob>chi2) of Hausman statistics is significant or not. If the analysis indicates that prob>chi2 is significant, it implies that the null hypothesis is rejected and that the fixed effects model is considered suitable over the random effects model. But if the result of the analysis is otherwise, random effects model will be considered more suitable. Finally, the use of PPML estimator was also leveraged on fixed effects model so that unobserved heterogeneity across observations can be controlled for.

3.2.5 Sources of Data

Data used for this thesis were derived from various sources covering the period 2005-2016. Bilateral trade flows were fromWorld Integrated Trade Solution (WITS) developed by the World Bank. Trade values are expressed in thousand USD. This thesis also follows literature concerning the trade flows by defining commodity structure as categories 0-9, SITC Revision 2.Other time series data used for this thesis include: annual figures for GDP of all trading partner, simple average tariff rate, computed ratio of total roads network to total population from WDIwhile maritime transport (measured by LSCI) from UNCTADstat and real effective exchange rate from Global Economic Monitor (GEM).

In addition, doing business indicators (required number of documents, time and costs to export and import a container)were sourced from World Development Indicators (WDI). Finally, institutional quality indicator (measured by control of corruption, regulatory quality, rule of law andpolitical stability and absence of violence/terrorism)were sourced fromWorldwide Governance Indicators (WGI).

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

4.0 Introduction

This chapter is devoted to analysis and discussion of the estimated results for the study. The descriptive analysis of variables used in the estimation is first presented. This is followed by estimation issues and pre-estimation diagnoses (multicollinearity test), where all the processes involved in the estimations are discussed. Finally, the estimated results are presented in line with the study's objectives.

4.1 Descriptive Analysis

The descriptive analysis presented in Table 4.1 shows the basic characteristics of trade costs and trade flows indicators for Nigeria and its major trading partners. The analysis covers exports and imports trade models. In each of the models, the summary statistics was done for aggregate, agriculture, manufacturing and extractive sectors. The statistics presented include the mean, maximum, minimum, standard deviation, and coefficient of variation with consideration to pre-TFA (i.e., period before trade facilitation agreement (2005-2013)) and during TFA period (2014-2016), respectively.

Starting with trade flows components for the aggregate followed by sectoral exports, the result of the analysis reveals that Nigeria's aggregate, extractive and agriculture sector exports averaged US$3.262 billion,US$3.062 billion and US$189.20 million before TFA period. These values are relatively higher than the average during TFA period. Also, coefficient of variation is significantly skewed towards the same direction indicating no much variation across the trading partners. Nigeria's aggregate, agriculture and manufacturing sector GDP recorded higher average (US$447.71 billion, US$106.32 billion and US$43.41 billion) during TFA period with variations across the trading partners. Agriculture sector among others also had the highest contribution of US$98.14 billion and US$110.50 billion to aggregate GDP before and during TFA periods (See Table 4.2).

On the other hand, aggregate GDP of Nigeria's trading partners is dominated by manufacturing sector with higher average of US$2,856.98 billion during TFA period and no variation across the trading partners. Similarly, GDP at the aggregate and sectoral levels recorded highest during TFA period.

Tariff is one of the trade costs components.It is being imposed by the importing countries with no much variation across the trading partners. The same tariff rate was used for both agriculture and extractive sectors since they are classified as primary products (see Tables 4.1 and 4.2). The maximum tariff rate levied on all products duringTFA period (11.16 percent) is double-digit but relatively lower compared with pre-TFA period (14.03 percent). All the other trade costs components assumed the same average, maximum and minimum values for aggregate and sectoral exports analysis for the periods under consideration. However, the result of analysis reveals much variation across the trading partners in terms of real effective exchange rate for exporters and importers, exporters' maritime transport, ratio of total roads network to total population of exporters, quality of institutions of exporters, number of documents required to export and import, time required (number of days) to process export and cost of exporting a container per US$ (see Tables 4.1 and 4.2).

Table 4.1: Descriptive Analysis for Exports between 2005 and 2013 (Pre-TFA period)

Nigeria's Aggregate Exports																		
Variable	agreg3_exp3	agreggdp~x3	agreggdp~m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Obs	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
Mean	3262.3	343.5	2301.1	3.9	99.5	99.4	17.7	59.9	0.13	1.11	-1.2	0.7	9.1	5.7	26.4	15.4	1195.3	1120.7
Std. D.	5607.01	53.8	3380.4	2.74	8.27	8.41	3.38	32.53	0.01	1.16	0.04	0.86	0.32	2.72	5.25	11.74	209.39	441.97
Min	0.01	260.5	22.3	0.00	88.55	72.76	12.79	5.28	0.12	0.05	-1.29	-1.47	9.00	2.00	22.90	4.00	798.00	367.00
Max	34758.3	425.4	15802.9	14.0	116.0	127.8	21.8	157.5	0.14	6.16	-1.1	1.8	10.0	13.0	41.0	63.0	1560.0	2410.0
CV	171.9	15.7	146.9	70.4	8.3	8.5	19.1	54.3	6.1	104.6	-3.2	118.6	3.5	47.5	19.9	76.3	17.5	39.4
Nigeria's Agriculture Sector Exports																		
Variable	agric3_exp3	aggdp3_x3	aggdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	189.20	81.50	71.46	2.31	99.47	99.38	17.66	59.86	0.13	1.11	-1.25	0.72	9.1	5.72	26.43	15.39	1195.33	1120.67
Std. D.	433.5	11.4	131.2	3.0	8.3	8.4	3.4	32.5	0.01	1.16	0.04	0.9	0.3	2.7	5.3	11.7	209.4	442.0
Min	0.002	63.34	0.08	0.00	88.55	72.76	12.79	5.28	0.12	0.05	-1.29	-1.47	9.00	2.00	22.90	4.00	798.00	367.00
Max	3618.3	98.1	656.9	15.0	116.0	127.8	21.8	157.5	0.14	6.16	-1.1	1.8	10.0	13.0	41.0	63.0	1560.0	2410.0
CV	229.1	14.0	183.6	131.2	8.3	8.5	19.1	54.3	6.1	104.6	-3.2	118.6	3.5	47.5	19.9	76.3	17.5	39.4
Nigeria's Manufacturing Sector Exports																		
Variable	manuf3_exp3	mangdp3_x3	mangdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	105.63	24.10	372.26	3.50	99.47	99.38	17.66	59.86	0.13	1.11	-1.25	0.72	9.1	5.72	26.43	15.39	1195.33	1120.67
Std. D.	177.72	7.11	565.89	3.15	8.27	8.41	3.38	32.53	0.01	1.16	0.04	0.86	0.32	2.72	5.25	11.74	209.39	441.97
Min	0.002	15.72	1.87	0.00	88.55	72.76	12.79	5.28	0.12	0.05	-1.29	-1.47	9.00	2.00	22.90	4.00	798.00	367.00
Max	1023.8	38.8	2857.0	12.8	116.0	127.8	21.8	157.5	0.14	6.16	-1.1	1.8	10.0	13.0	41.0	63.0	1560.0	2410.0
CV	168.2	29.5	152.0	89.9	8.3	8.5	19.1	54.3	6.1	104.6	-3.2	118.6	3.5	47.5	19.9	76.3	17.5	39.4

Table 4.1 (Continued): Descriptive Analysis for Exports between 2005 and 2013 (Pre-TFA period)

Nigeria's Extractive Sector Exports																		
Variable	extract3_exp3	extragdp3_x3	extragdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	3062.2	67.98	225.26	2.3	99.5	99.4	17.7	59.9	0.13	1.11	-1.2	0.7	9.1	5.7	26.4	15.4	1195.3	1120.7
Std. D.	5615.2	2.73	297.48	3.0	8.3	8.4	3.4	32.5	0.01	1.16	0.04	0.9	0.3	2.7	5.3	11.7	209.4	442.0
Min	0.00	63.90	0.72	0.00	88.55	72.76	12.79	5.28	0.12	0.05	-1.29	-1.47	9.00	2.00	22.90	4.00	798.00	367.00
Max	34384.1	71.66	1273.1	15.0	116.0	127.8	21.8	157.5	0.14	6.16	-1.1	1.8	10.0	13.0	41.0	63.0	1560.0	2410.0
CV	183.4	4.02	132.1	131.2	8.3	8.5	19.1	54.3	6.1	104.6	-3.2	118.6	3.5	47.5	19.9	76.3	17.5	39.4

Source: Author's computation.

Note: Std. D. represents standard deviation while CV is coefficient of variation.

The improved performance of Nigeria's manufacturing sector exports in recent time reflects a positive change in its manufacturing sector GDP. For instance, maximum value of Nigeria's manufacturing sector GDP during TFA (US$44.47 billion) exceeded the value during pre-TFA period (see Table 4.3). Conversely, Table 4.2 shows that both the maximum and average values of extractive sector GDP during TFA (US$66.92 billion and US$63.11 billion) are declining compared with its values during pre-TFA period when it recorded US$71.66 billion and US$67.98 billion, respectively.

Table 4.2: Descriptive Analysis for Exports between 2014 and 2016 (During TFA period)

Nigeria's Aggregate Exports																		
Variable	agreg3_exp3	agreggdp~x3	agreggdp~m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Obs	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Mean	2639.9	447.7	2588.9	4.0	115.0	94.9	25.8	70.2	0.11	1.13	-1.2	0.7	3.0	2.2	5.5	1.6	250.00	102.2
Std. D.	3089.5	15.87	3776.1	2.8	4.4	14.2	4.9	36.6	0.002	1.23	0.1	0.9	4.3	3.6	0.0	3.5	0.0	126.8
Min	10.31	426.55	28.78	0.00	109.37	69.16	21.93	4.75	0.11	0.04	-1.32	-0.66	0.00	0.00	5.46	0.04	250.00	0.00
Max	14981.0	464.28	16597.5	11.2	119.9	128.2	32.7	167.5	0.11	5.91	-1.2	1.9	9.0	13.0	5.5	22.8	250.00	474.0
CV	117.0	3.5	145.9	69.6	3.8	15.0	18.9	52.2	2.2	108.9	-4.1	116.0	142.6	160.4	0.0	222.0	0.0	124.1
Nigeria's Agriculture Sector Exports																		
Variable	agric3_exp3	aggdp3_x3	aggdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	87.9	106.3	84.1	2.8	115.0	94.9	25.8	70.2	0.11	1.13	-1.2	0.7	3.0	2.2	5.5	1.6	250.00	102.2
Std. D.	123.6	3.4	164.4	3.3	4.4	14.2	4.9	36.6	0.002	1.23	0.1	0.9	4.3	3.6	0.0	3.5	0.0	126.8
Min	0.04	102.33	0.10	0.00	109.37	69.16	21.93	4.75	0.11	0.04	-1.32	-0.66	0.00	0.00	5.46	0.04	250.00	0.00
Max	566.3	110.5	733.7	14.0	119.9	128.2	32.7	167.5	0.11	5.91	-1.2	1.9	9.0	13.0	5.5	22.8	250.00	474.0
CV	140.7	3.2	195.4	118.0	3.8	15.0	18.9	52.2	2.2	108.9	-4.1	116.0	142.6	160.4	0.0	222.0	0.0	124.1
Nigeria's Manufacturing Sector Exports																		
Variable	manuf3_exp3	mangdp3_x3	mangdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	125.9	43.4	448.6	3.4	115.0	94.9	25.8	70.2	0.11	1.13	-1.2	0.7	3.0	2.2	5.5	1.6	250.00	102.2
Std. D.	301.2	1.1	726.3	3.0	4.4	14.2	4.9	36.6	0.002	1.23	0.1	0.9	4.3	3.6	0.0	3.5	0.0	126.8
Min	0.44	41.93	2.42	0.00	109.37	69.16	21.93	4.75	0.11	0.04	-1.32	-0.66	0.00	0.00	5.46	0.04	250.00	0.00
Max	1997.5	44.5	2857.0	10.3	119.9	128.2	32.7	167.5	0.11	5.91	-1.2	1.9	9.0	13.0	5.5	22.8	250.00	474.0
CV	239.2	2.5	161.9	86.9	3.8	15.0	18.9	52.2	2.2	108.9	-4.1	116.0	142.6	160.4	0.0	222.0	0.0	124.1

Table 4.2 (Continued): Descriptive Analysis for Exports between 2014 and 2016 (During TFA period)

Nigeria's Extractive Sector Exports																		
Variable	extract3_exp3	extragdp3_x3	extragdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	2438.4	63.11	259.1	2.8	115.0	94.9	25.8	70.2	0.11	1.13	-1.2	0.7	3.0	2.2	5.5	1.6	250.00	102.2
Std. D.	2986.7	4.19	378.7	3.3	4.4	14.2	4.9	36.6	0.002	1.23	0.1	0.9	4.3	3.6	0.0	3.5	0.0	126.8
Min	0.0002	57.33	3.15	0.00	109.37	69.16	21.93	4.75	0.11	0.04	-1.32	-0.66	0.00	0.00	5.46	0.04	250.00	0.00
Max	14675.7	66.92	1579.9	14.0	119.9	128.2	32.7	167.5	0.11	5.91	-1.2	1.9	9.0	13.0	5.5	22.8	250.00	474.0
CV	122.5	6.64	146.2	118.0	3.8	15.0	18.9	52.2	2.2	108.9	-4.1	116.0	142.6	160.4	0.0	222.0	0.0	124.1

Source: Author's computation.

Note: Std. D. represents standard deviation while CV is coefficient of variation.

For import, the average manufacturing sector GDP (US$448.65 billion) during TFA period is higher than that of pre-TFA period (US$372.26 billion). Similarly, both the average and maximum GDP reported by the extractive sector (US$259.13 billion and US$1579.93 billion) during TFA period is relatively higher compared with the values during pre-TFA period. The maximum tariff rate imposed on manufacturing products during TFA period (10.26 percent) is lower compared with the rate during pre-TFA and full periods (12.80 percent)

Prior to TFA, in December 2013, the doing business indicators comprises three requirements for both exporters and importers (number of documents required, the time required, and cost to export and import a container per US$). However, the implementation of the TFA signed by all the WTO member countries in December 2013 integrated these three requirements into two: Time to export/import, documentary compliance (hours) and cost to export/import, documentary compliance (US$). The main rationale for the integration of these requirements is to facilitate quick clearance of goods at the Ports. In addition, the introduction of newly versions of Automated System for Customs Data Entry (ASYCUDA++) also aided the entire processes and operations at the Ports. Based on this development, the minimum and maximum number of documents required in Nigeria to export during TFA period is 0 and 9 compared with minimum of 9 and maximum of 10 documents required before the TFA period. Minimum and maximum number of documents required to import in Nigeria during TFA is 0 and 13 as against 2 and 13 number of documents required during pre-TFA period.

In the case of time required (days) to export in Nigeria, a minimum and maximum of 5.46 daysis required during TFA period as against minimum of 22.90 days and maximum of 41.00 days required during pre-TFA period. The required minimum and maximum number of days to import by Nigeria's importers during TFA is 0.04 days (equivalent to 1 hour) and 22.75 days compared with minimum of 4 days and maximum of 63 days required during pre-TFA period. With TFA, both minimum and maximum cost of exporting a container (US$) in Nigeria is bearable (US$250.00) relative to that of pre-TFA period with minimum of US$798.00 and maximum of US$1,560.00. Similarly, majority of the European Union (EU) countries require zero cost to import a container while a maximum of US$447.00 is required in other trading

partners relative to minimum and maximum of US$367.00 and US$2,410.00 required during pre-TFA periods (see Tables 4.1 and 4.2).

Table 4.3: Descriptive Analysis for Imports between 2005 and 2013 (Pre-TFA period)

Nigeria's Aggregate Imports																		
Variable	agreg3_imp3	agreggdp~m3	agreggdp~x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Obs	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
Mean	1331.1	343.5	2301.1	9.8	99.5	99.4	17.7	59.9	0.13	1.11	-1.2	0.7	13.4	4.8	42.1	13.1	1410.0	995.5
Std. D.	1807.0	53.8	3380.4	0.4	8.3	8.4	3.4	32.5	0.01	1.16	0.04	0.9	1.3	1.9	5.2	6.6	257.6	360.8
Min	6.39	260.5	22.3	9.34	88.55	72.76	12.79	5.28	0.12	0.05	-1.29	-1.47	13.00	2.00	33.90	6.00	1050.00	390.00
Max	11517.3	425.4	15802.9	10.7	116.0	127.8	21.8	157.5	0.14	6.16	-1.1	1.8	17.0	9.0	53.0	47.0	1960.0	2410.0
CV	135.7	15.7	146.9	4.3	8.3	8.5	19.1	54.3	6.1	104.6	-3.2	118.6	9.4	40.4	12.5	50.5	18.3	36.2
Nigeria's Agriculture Sector Imports																		
Variable	agric3_imp3	aggdp3_m3	aggdp3_x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	243.9	81.5	71.5	10.9	99.5	99.4	17.7	59.9	0.13	1.11	-1.2	0.7	13.4	4.8	42.1	13.1	1410.0	995.5
Std. D.	459.2	11.4	131.2	1.5	8.3	8.4	3.4	32.5	0.01	1.16	0.04	0.9	1.3	1.9	5.2	6.6	257.6	360.8
Min	0.79	63.34	0.08	9.60	88.55	72.76	12.79	5.28	0.12	0.05	-1.29	-1.47	13.00	2.00	33.90	6.00	1050.00	390.00
Max	3346.6	98.1	656.9	13.1	116.0	127.8	21.8	157.5	0.14	6.16	-1.1	1.8	17.0	9.0	53.0	47.0	1960.0	2410.0
CV	188.3	14.0	183.6	13.6	8.3	8.5	19.1	54.3	6.1	104.6	-3.2	118.6	9.4	40.4	12.5	50.5	18.3	36.2
Nigeria's Manufacturing Sector Imports																		
Variable	manuf3_imp3	mangdp3_m3	mangdp3_x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	1003.0	24.1	372.3	9.99	99.5	99.4	17.7	59.9	0.13	1.11	-1.2	0.7	13.4	4.8	42.1	13.1	1410.0	995.5
Std. D.	1450.6	7.1	565.9	1.6	8.3	8.4	3.4	32.5	0.01	1.16	0.0	0.9	1.3	1.9	5.2	6.6	257.6	360.8
Min	1.47	15.72	1.87	7.52	88.55	72.76	12.79	5.28	0.12	0.05	-1.29	-1.47	13.00	2.00	33.90	6.00	1050.00	390.00
Max	8956.0	38.8	2857.0	13.3	116.0	127.8	21.8	157.5	0.14	6.16	-1.1	1.8	17.0	9.0	53.0	47.0	1960.0	2410.0
CV	144.6	29.5	152.0	16.4	8.3	8.5	19.1	54.3	6.1	104.6	-3.2	118.6	9.4	40.4	12.5	50.5	18.3	36.2

Table 4.3 (Continued): Descriptive Analysis for Imports between 2005 and 2013 (Pre-TFA period)

Nigeria's Extractive Sector Imports																		
Variable	extract3_imp3	extragdp3_m3	extragdp3_x3	Trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	84.5	67.98	225.26	10.9	99.5	99.4	17.7	59.9	0.13	1.11	-1.2	0.7	13.4	4.8	42.1	13.1	1410.0	995.5
Std. D.	309.7	2.73	297.48	1.5	8.3	8.4	3.4	32.5	0.01	1.16	0.04	0.9	1.3	1.9	5.2	6.6	257.6	360.8
Min	0.00	63.90	0.72	9.60	88.55	72.76	12.79	5.28	0.12	0.05	-1.29	-1.47	13.00	2.00	33.90	6.00	1050.00	390.00
Max	3560.0	71.66	1273.1	13.1	116.0	127.8	21.8	157.5	0.14	6.16	-1.1	1.8	17.0	9.0	53.0	47.0	1960.0	2410.0
CV	366.5	4.02	132.1	13.6	8.3	8.5	19.1	54.3	6.1	104.6	-3.2	118.6	9.4	40.4	12.5	50.5	18.3	36.2

Source: Author's computation.

Note: Std. D. represents standard deviation while CV is coefficient of variation.

In the import models, Nigeria's aggregate, manufacturing and extractive imports during TFA period averaged (US$1.580 billion, US$1.125 billion and US$278.54 million), higher than the values recorded during pre-TFA period. However, the average value of Nigeria's agriculture imports for TFA period is relatively lower compared with the value before TFA. The result of analysis further reveals no much variation across the trading partners both at aggregate and sectoral levels (See Table 4.3).

In addition, the minimum and maximum number of documents required in Nigeria to import during TFA period is 0 and 13 relative to minimum of 13 and maximum of 17 documents required before TFA period. Also, minimum and maximum number of documents required to export by Nigeria's trading partners during TFA is 0 and 9 compared with 2 and 9 documents required before TFA period. During the TFA period, Nigeria required a maximum and minimum of 7.21 days to import as against minimum of 33.90 days and maximum of 53 days during pre-TFA period.

However, Nigeria's trading partners required a minimum of 0.04 days (equivalent to 1 hour) and maximum of 5 days to export during TFA period as against minimum and maximum of 6 days and 47 days during pre-TFA period. In addition, Nigeria required a minimum and maximum of US$546.00 and US$546.30 to import a container during TFA period. This is lower compared with US$1,050.00 and US$1,960.00 required during pre-TFA period. Lastly, some of Nigeria's trading partners required zero cost to export a container while some other required a maximum of US$226.40, as against a minimum and maximum of US$390.00 and US$2,410.00 during the pre-TFA period (See Table 4.3 and 4.4).

Table 4.4: Descriptive Analysis for Imports between 2014 and 2016 (During TFA period)

Nigeria's Aggregate Imports																		
Variable	agreg3_imp3	agreggdp~m3	agreggdp~x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Obs	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Mean	1580.2	447.7	2588.9	10.3	115.0	94.9	25.8	70.2	0.11	1.13	-1.2	0.7	4.3	1.5	7.2	0.8	564.2	69.9
Std. D.	2478.9	15.87	3776.1	1.4	4.4	14.2	4.9	36.6	0.002	1.23	0.1	0.9	6.2	2.4	0.0	1.4	0.1	68.9
Min	51.87	426.55	28.78	8.33	109.37	69.16	21.93	4.75	0.11	0.04	-1.32	-0.66	0.00	0.00	7.21	0.04	564.00	0.00
Max	13701.2	464.28	16597.5	11.4	119.9	128.2	32.7	167.5	0.11	5.91	-1.2	1.9	13.0	9.0	7.2	5.0	564.3	226.4
CV	156.9	3.5	145.9	13.9	3.8	15.0	18.9	52.2	2.2	108.9	-4.1	116.0	142.6	159.5	0.0	171.5	0.0	98.5
Nigeria's Agriculture Sector Imports																		
Variable	agric3_imp3	aggdp3_m3	aggdp3_x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	176.7	106.3	84.1	9.97	115.0	94.9	25.8	70.2	0.11	1.13	-1.2	0.7	4.3	1.5	7.2	0.8	564.2	69.9
Std. D.	228.2	3.4	164.4	1.4	4.4	14.2	4.9	36.6	0.002	1.23	0.1	0.9	6.2	2.4	0.0	1.4	0.1	68.9
Min	0.01	102.33	0.10	8.40	109.37	69.16	21.93	4.75	0.11	0.04	-1.32	-0.66	0.00	0.00	7.21	0.04	564.00	0.00
Max	1141.5	110.5	733.7	11.8	119.9	128.2	32.7	167.5	0.11	5.91	-1.2	1.9	13.0	9.0	7.2	5.0	564.3	226.4
CV	129.2	3.2	195.4	14.1	3.8	15.0	18.9	52.2	2.2	108.9	-4.1	116.0	142.6	159.5	0.0	171.5	0.0	98.5
Nigeria's Manufacturing Sector Imports																		
Variable	manuf3_imp3	mangdp3_m3	mangdp3_x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	1125.0	43.4	448.6	10.3	115.0	94.9	25.8	70.2	0.11	1.13	-1.2	0.7	4.3	1.5	7.2	0.8	564.2	69.9
Std. D.	2373.0	1.1	726.3	1.6	4.4	14.2	4.9	36.6	0.002	1.23	0.1	0.9	6.2	2.4	0.0	1.4	0.1	68.9
Min	10.42	41.93	2.42	8.08	109.37	69.16	21.93	4.75	0.11	0.04	-1.32	-0.66	0.00	0.00	7.21	0.04	564.00	0.00
Max	13418.6	44.5	2857.0	11.8	119.9	128.2	32.7	167.5	0.11	5.91	-1.2	1.9	13.0	9.0	7.2	5.0	564.3	226.4
CV	210.9	2.5	161.9	15.8	3.8	15.0	18.9	52.2	2.2	108.9	-4.1	116.0	142.6	159.5	0.0	171.5	0.0	98.5

Table 4.4 (Continued): Descriptive Analysis for Imports between 2014 and 2016 (During TFA period)

Nigeria's Extractive Sector Imports																		
Variable	extract3_imp3	extragdp3_m3	extragdp3_x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	278.5	63.11	259.1	9.97	115.0	94.9	25.8	70.2	0.11	1.13	-1.2	0.7	4.3	1.5	7.2	0.8	564.2	69.9
Std. D.	564.7	4.19	378.7	1.4	4.4	14.2	4.9	36.6	0.002	1.23	0.1	0.9	6.2	2.4	0.0	1.4	0.1	68.9
Min	0.01	57.33	3.15	8.40	109.37	69.16	21.93	4.75	0.11	0.04	-1.32	-0.66	0.00	0.00	7.21	0.04	564.00	0.00
Max	2367.2	66.92	1579.9	11.8	119.9	128.2	32.7	167.5	0.11	5.91	-1.2	1.9	13.0	9.0	7.2	5.0	564.3	226.4
CV	202.7	6.64	146.2	14.1	3.8	15.0	18.9	52.2	2.2	108.9	-4.1	116.0	142.6	159.5	0.0	171.5	0.0	98.5

Source: Author's Computation.

Note: Std. Dev. denotes standard deviation and CV is coefficient of variation.

4.2 Pre-estimation Diagnoses

4.2.1 Pre-diagnostic Test

This sub-section discusses the correlation among explanatory variables in the models. The results are also divided into two, one for the exports trade model and the other for the imports trade model. For each of the two models, the correlation results are presented for aggregate, agriculture, manufacturing and extractive sectors. Since all the trade costs components except tariff in the exports trade models assume the same value for both aggregate and sectoral analysis, the correlation results of these variables are the same for aggregate and sectoral exports analysis (see Appendix 1). Starting with the exports trade models, the bivariate relationship between the dependent variable (aggregate/sectors) and each of the explanatory variables (aggregate GDP for exporter and importers, tariff, real effective exchange rate for exporter and importers, maritime transport for exporter and importers, ratio of total roads network to total population for exporter and importers, institutional quality for exporter and importers, required number of documents to exports/imports, days and costs to export/import a container per US$) are tested for aggregate, agriculture, manufacturing and extractive sectors, respectively.

Among the explanatory variables in the aggregate exports model, the analysis shows positive relationship between each pair. It was shown in the sectoral models that the magnitude of relationship between some of the explanatory variables was also high but could not result to econometrics problem in the model. For instance, laggdp_x and reer_x (0.873), laggdp_x and mat_x (0.847) in the agriculture exports model, while lmangdp_x and reer_x (0.936) and lmangdp and mat_x (0.848) in the manufacturing exports model. None of these variables have relationship that is too high to cause multicollinearity problem in the model. Finally, in the extractive sector exports, high degree of correlation between rot_x and ndp_x2 (0.879) and lcos_x2 and lcos_m2 (0.820) could equally not cause serious econometrics problem (See Table A-4 in the Appendix). The same issue is observed in the case of imports models and this is based on the standard matrix that any relationship that is above 95 percent can be judged to be strongly correlated (See Table A-5 in the Appendix). It could also be seen in each

of the models that negative relationship is established among each pair of explanatory variables while some others produce positive but weak relationship.

Table 4.5: Results of Correlation between Pairs of Variables (Aggregate Exports Model)

	laggrgdp_x	laggrgdp_m	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	lcos_x2	lcos_m2
laggregdp_x	1.000																
laggregdp_m	0.052	1.000															
trf	-0.015	-0.342	1.000														
reer_x	0.902	0.049	-0.020	1.000													
reer_m	-0.111	0.042	-0.313	-0.112	1.000												
mat_x	0.875	0.046	-0.077	0.777	-0.142	1.000											
mat_m	0.166	0.574	-0.464	0.146	0.330	0.150	1.000										
rot_x2	-0.969	-0.050	0.005	-0.875	0.140	-0.855	-0.171	1.000									
rot_m2	0.026	0.109	-0.252	0.019	0.019	0.020	-0.176	-0.023	1.000								
inq_x	-0.145	-0.005	-0.004	-0.179	-0.036	0.164	-0.004	0.036	-0.014	1.000							
inq_m	0.013	0.259	-0.771	0.016	0.219	0.009	0.266	-0.011	0.426	-0.008	1.000						
ndr_x2	-0.531	-0.030	-0.031	-0.437	0.191	-0.678	-0.124	0.676	-0.005	-0.366	-0.002	1.000					
ndr_m2	-0.356	-0.359	0.490	-0.293	-0.019	-0.425	-0.439	0.432	-0.251	-0.195	-0.584	0.572	1.000				
ndp_x2	-0.826	-0.045	0.030	-0.787	0.152	-0.770	-0.150	0.879	-0.013	0.044	-0.009	0.731	0.444	1.000			
ndp_m2	-0.409	-0.423	0.603	-0.389	-0.085	-0.402	-0.395	0.450	-0.259	-0.010	-0.637	0.409	0.655	0.494	1.000		
lcos_x2	-0.471	-0.027	-0.029	-0.511	0.187	-0.545	-0.106	0.586	-0.002	-0.035	-0.003	0.743	0.424	0.783	0.463	1.000	
lcos_m2	-0.394	-0.083	0.102	-0.425	0.074	-0.462	-0.282	0.489	0.108	-0.005	-0.076	0.654	0.439	0.670	0.502	0.820	1.000

Source: Author's computation.

Table 4.6: Results of Correlation between Pairs of Variables (Aggregate Imports Model)

	laggrgdp_m	laggrgdp_x	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	lcos_m2	lcos_x2
laggregdp_m	1.000																
laggregdp_x	0.052	1.000															
trf	0.361	0.015	1.000														
reer_m	0.902	0.049	0.315	1.000													
reer_x	-0.111	0.042	0.002	-0.112	1.000												
mat_m	0.875	0.046	-0.051	0.777	-0.142	1.000											
mat_x	0.166	0.574	0.063	0.146	0.330	0.150	1.000										
rot_m2	-0.969	-0.050	-0.397	-0.875	0.140	-0.855	-0.171	1.000									
rot_x2	0.026	0.109	0.014	0.019	0.019	0.020	-0.176	-0.023	1.000								
inq_m	-0.145	-0.005	-0.372	-0.179	-0.036	0.164	-0.004	0.036	-0.014	1.000							
inq_x	0.013	0.259	0.004	0.016	0.219	0.009	0.266	-0.011	0.426	-0.008	1.000						
ndr_m2	-0.586	-0.033	0.015	-0.482	0.183	-0.707	-0.129	0.720	-0.006	-0.339	-0.003	1.000					
ndr_x2	-0.393	-0.242	0.024	-0.327	0.007	-0.496	-0.236	0.496	-0.239	-0.257	-0.550	0.703	1.000				
ndp_m2	-0.831	-0.045	-0.344	-0.811	0.175	-0.796	-0.155	0.897	-0.014	0.032	-0.009	0.784	0.552	1.000			
ndp_x2	-0.521	-0.263	-0.210	-0.514	-0.015	-0.519	-0.303	0.577	-0.198	0.001	-0.535	0.546	0.746	0.682	1.000		
lcos_m2	-0.287	-0.019	-0.108	-0.310	0.148	-0.376	-0.073	0.399	0.005	-0.049	0.001	0.667	0.466	0.728	0.559	1.000	
lcos_x2	-0.389	-0.069	-0.147	-0.426	0.106	-0.443	-0.274	0.482	-0.012	-0.017	-0.181	0.590	0.528	0.709	0.643	0.744	1.000

Source: Author's computation.

4.3 Presentation of the Empirical Results

4.3.1 Determining the Impact of DTCs and ITCs on Nigeria's Exports

4.3.1.1 The Impact of DTCs and ITCs on Nigeria's Aggregate Exports to its major Trading Partners

Table 4.7a presents the results of the two partitioned models (i.e., models 1 and 2) to determine the impact of domestic and international trade costs on Nigeria's aggregate exports for the full period (2005-2016). The results of the pair-wise period (2005-2013) for the two models are also presented in Table 4.7b. In each of the models estimated, the F-test conducted reveals the presence of heterogeneity. This implies that the pooled 2SLS model cannot be chosen. Therefore, Hausman test is used as a model selection criteria to choose between fixed effect (FE) and random effect (RE) models. In the case of model 1 presented in Table 4.7a, RE model is preferred while FE model is preferred for model 2. The estimates for the pair-wise period presented in Table 4.7b reveal that FE model is preferred for both models based on the Hausman test statistics.

Starting with model 1 of full period analysis, the estimated results in Table 4.7a reveal that among the significant explanatory variables in the model, Nigeria's REER and tariff do not follow their expected signs. This is because aggregate export is dominated by oil which is not responsive to tariff and exchange rate as oil is controlled by the external body, i.e., Organization of the Petroleum Exporting Countries (OPEC).In the pair-wise period, however, the estimates in Table 4.7b show that none of the significant variables is inconsistent with the expected sign. For model 2, the full period estimates presented in Table 4.7a show that GDP of trading partners, Nigeria's REER and number of documents required to export fail to have their expected signs while none of the significant variables in the pair-wise period also turned out with wrong signs (see Table 4.7b).

The trade costs variables are classified into two components(i.e., ITCs and DTCs).The component of ITCs includes tariff, real effective exchange rate and maritime transport. These are internationally determined costs without the influence of home country. The component of DTCs comprises the quality of institutions, ratio of total roads network to total population, required number of documents, time required measured by days,

and cost to export and import a container. They all reflect the domestic economic environment.

The full period estimates for models 1 and 2 in Table4.7a show that the component of ITCs(REER of trading partners and Nigeria's maritime transport) exert significant negative impactbut significant positive impact is exerted by tariff, maritime transport of trading partners and Nigeria's REER on aggregate exports. For the component of DTCs, ratio of roads network to total population of exporter and importer, institutional quality of exporter and importerand number of documents to export had significant positive impact.In model 2, only number of documents to import has significant negative impact on aggregate exports.In the same vein, the estimates of models 1 and 2 in Table 4.7b show that maritime transport of trading partners is the only ITCs component with positive impact. The DTCs component (ratio of roads network to total population of trading partners and institutional quality of Nigeria) has significant positive impact both in models 1 and 2 (See Table 4.7b).

Based on the gravity model literature (such as Abe & Wilson, 2009; Deen-Swarray *et al*., 2012; Bandyopadhyay & Roy, 2007 andBandyopadhyay *et al.,* 2015),better maritime transport, improved ratio of roads network to population, strong institutional quality, depreciation of exporter's REER/appreciation of importer's REER (more local currency per unit of foreign currency) and less number of documents, days and cost tend to reduce trade costs. However, tariff, appreciation of exporter's REER/depreciation of importer's REER (less local currency per unit of foreign currency), more number of documents, days required and cost to export and import a 20-foot container are all associated with higher trade costs. Model 1 estimates in Table 4.7a reveal that aggregate GDP measured by the economic size of both Nigeria and trading partners exert positive and significant impact on its aggregate exports.

From the estimated results in Table 4.7a, the differing impact is clearly shown as the coefficient of GDP of Nigeria exerts higher impact than that of the importer on aggregate exports. This finding is consistent with previous studies (Behar*et al.,* 2009; Ackah*et al.,* 2012 and Ezzat, 2015) that economic size (i.e., GDP of both exporters and importers)is one of thekey determinants of bilateral trade.Conversely, the model 2 estimates in Table 4.7a show significant positive impact of GDP of Nigeria while negative impact of the trading partners onits aggregate exports. Model 1 estimate in the

pair-wise period shows only GDP of Nigeria having significant impact on its aggregate exports. Surprisingly, model 2 in 4.7b reveals that both GDP of Nigeria and that of the trading partners had no significant impact on aggregate exports.

A rise in REER represents appreciation which is associated with higher trade costs and vice-versa. Appreciation of Nigeria's currency makes local goods exported more costlyand uncompetitive and consequently reduces its demand in the foreign markets.A background analysis shows evidence of a continuous rise in Nigeria's REER (i.e., appreciation) relative to its major trading partners, except China, Singapore, UAE and UK, due to high GDP per capita and oil prices,particularly between 2009 and 2016. Such appreciation is expected to increase trade costs and thus reduce aggregate exports.This is contrary to the estimated results of the two models in Table 4.7a showing significant positive coefficient of Nigeria's REER. The estimates further suggest that a 10 percent appreciation of the Naira increases aggregate exports by 0.7 percent and 0.4 percent in models 1 and 2. But this does not conform with the theory. A possible explanation may be that larger proportion of goods exported by Nigeria was dominated by extractive resources, particularly crude oil. In the world market, the demand for extractive products such as crude oil is very high. Also, due to inelastic nature of such product, aggregate exports could possibly not respond negatively to local currency appreciation.

On the other hand, significant negative coefficient of importer's REER (fall) signifies depreciation of trading partners' currencies against the Naira. This also made Nigeria's exports become less competitive (i.e., costly) in the foreign markets. In this case, the purchasing power of trading partners' currencies had reduced and this translates to higher trade costs. This scenario is also supported in the background analysis which shows that majority of Nigeria's major trading partners, except China, India, Singapore, UK and US maintained a depreciated REER, as reflected in their trade openness. The depreciation was to reduce their countries' imports by reducing the purchasing power of their currencies associated with high trade costs. However, in this analysis the coefficient is very low, such that a 10 percent depreciation of trading partners' REER reduces Nigeria's aggregate exports by 0.2 percent and 0.3 percent, respectively.

Table 4.7a: Impact of ITCs and DTCs on Nigeria's Aggregate Exports for the period 2005-2016

	Model 1 (Full Period)			Model 2 (Full Period)		
Dependent variable Aggregate Exports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Aggregate GDP Nigeria (log)	29.166 (2.33)**	20.076 (3.38)***	20.816 (3.39)***	9.981 (1.58)	17.353 (2.89)***	16.877 (2.65)***
Aggregate GDP Partners (log)	0.514 (5.57)***	-1.736 (-1.50)	0.429 (2.22)**	0.531 (5.77)***	-2.473 (-2.20)**	0.293 (1.39)
Tariff	0.254 (3.73)***	-0.010 (-0.06)	0.208 (1.81)*	0.288 (3.97)***	0.018 (0.09)	0.279 (2.15)**
Cost to export a container (Nigeria)	-0.003 (-1.46)	-0.002 (-1.12)	-0.002 (-1.25)	-0.002 (-3.78)***	-0.0001 (-0.25)	-0.001 (-1.62)
Cost to import a container (Partners)	0.002 (5.41)***	0.0001 (0.28)	0.001 (1.30)	0.002 (6.70)***	-0.0001 (-0.16)	0.001 (2.03)**
Maritime transport (Nigeria)	-0.140 (-1.64)	-0.091 (-1.96)**	-0.088 (-1.83)*	-0.003 (-0.04)	-0.074 (-1.36)	-0.054 (-0.92)
Maritime transport (Partners)	0.016 (3.29)***	0.073 (2.06)**	0.017 (1.73)*	0.017 (3.13)***	0.137 (4.18)***	0.031 (2.75)***
Institutional quality (Nigeria)	13.974 (1.80)*	9.022 (2.25)**	9.089 (2.19)**	8.619 (2.16)**	12.808 (3.74)***	11.633 (3.22)***
Institutional quality (Partners)	0.054 (0.23)	1.391 (1.53)	-0.251 (-0.63)	0.227 (0.90)	2.272 (2.14)**	-0.324 (-0.75)
Real effective exchange rate (Nigeria)	0.068 (2.43)**	0.074 (3.42)***	0.071 (3.25)***	0.029 (1.09)	0.038 (1.74)*	0.034 (1.46)
Real effective exchange rate (Partners)	-0.021 (-1.74)*	-0.027 (-2.08)**	-0.021 (-1.85)*	-0.018 (-1.46)	-0.030 (-2.10)**	-0.018 (-1.36)
Ratio of road transport to population (Nigeria)	0.461 (2.26)**	0.336 (3.19)***	0.325 (3.02)***	0.106 (0.84)	0.322 (2.70)***	0.257 (2.03)**
Ratio of road transport to population (Partners)	-0.00002 (-0.21)	0.001 (1.66)*	0.0002 (0.74)	-0.0001 (-0.74)	0.002 (2.72)***	0.0003 (1.37)
Days to export (Nigeria)	0.115 (0.65)	0.145 (1.07)	0.136 (0.98)	-	-	-
Days to import (Partners)	0.008 (0.39)	0.006 (0.29)	0.019 (0.96)	-	-	-
Documents to export (Nigeria)	-	-	-	0.165 (1.77)*	0.226 (2.54)**	0.121 (1.38)
Documents to import (Partners)	-	-	-	0.049 (0.72)	-0.165 (-1.68)*	0.045 (0.55)
Constant	-820.226 (-2.37)**	-513.586 (-3.08)***	-586.928 (-3.46)***	-273.874 (-1.53)	-415.813 (-2.42)**	-465.202 (-2.57)**
Over identification test (p-value)	1.072 (0.8987)			0.055 (0.8150)		
F-test		8.80 (0.0000)			9.38 (0.0000)	
Hausman test		8.93 (0.7784)			33.75 (0.0013)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	200	200	200	220	220	220
R-square	0.482	0.246	0.550	0.507	0.192	0.445

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1
The measure of aggregate exports includes the summation of agriculture, manufacturing and extractivesectors' exports. While the summation of industry and agriculture, value added (constant 2010 US$) givesrise to Aggregate GDP across the trading partners.
Source: Author's computation.

High tariff is expected to reduce aggregate exports, but a contrary case is shown in Table 4.7a, where the estimate in model 1 shows a significant positive coefficient. A possible explanation for such case could be due to high quality coupled with high preference for consuming Nigeria's products in the foreign markets. Based on these conditions, high demand encourages Nigeria's exports. Imposing high tariff could possibly not discourage such demand. On the contrary, an insignificant impact of tariff in some of the specifications is expectedbecause tariff reduction has been considered a necessary but not a sufficient condition for trade flows (OECD/WTO, 2015). In recent time,attention has been shifted from constant tariffs reduction as a result of General Agreement on Tariffs and Trade (GATT), towards non-tariff barriers and trade facilitation.

As regard the maritime transport that measures how well countries are connected to global shipping networks and accessible to global trade, estimates of the two models in Table 4.7a show that maritime transport of trading partners had positive and significant impact while that of Nigeria exerts significant negative impact. However, in the pair-wise period, only trading partners' maritime transport had significant positive impact on Nigeria's aggregate exports(see models 1 and 2 in Table 4.7b). The results suggest that trade costs associated with maritime shipping connectivity is a major determinants of trade of bilateral trade between Nigeria and its major trading partners. As demonstrated in the background analysis, Nigeria together with Cote d'Ivoire, Ghana and Norway had relatively lower connectivity values. This was due to underdeveloped nature of their maritime transport (port infrastructure), leading to port congestion. However, countries such as Belgium, China, France, Germany, Japan, Netherlands, Singapore, Spain, UK and US were having liner shipping connectivity index of at least sixty percent (60%). These countries were very efficient in terms of port infrastructure quality. High connectivity index of these countries as reflected in their trade facilitation procedure is an indication of low trade costs, thus aid both their accessibility and effective participation in the global trade but otherwise for Nigeria.The estimates therefore show that improved status of maritime transport of trading partners reduced trade costs associated with ports congestion leading to imposition of demurrage charges,thus promoting Nigeria's aggregate exports by 0.02 percent and 0.14 percent.Unimproved status of Nigeria's maritime transport could otherwise reduce it by 0.09 percent if such improvements could not be replicated in

Nigeria. A comparism of the estimates of the two indicators for model 1 in Table 4.7a shows that unimproved status of Nigeria's maritime transport could significantly reduce its aggregate exports,than further improvement in the status of maritime transport of the trading partners.

Model 2 estimates in Table 4.7a indicate positive and significant impact of ratio of total roads network to total population of both Nigeria and trading partners on Nigeria's aggregate exports. By comparison, ratio of total roads network to total population has greater impact for Nigeria than the trading partners thereby predicting differing impact on Nigeria's aggregate exports. However, model 1 estimates in Table 4.7a indicate that only ratio of total roads network to total population of Nigeria had significant positive impact on its aggregate exports. Similarly, the results of the two models (1 and 2) in Table 4.7b reveal significant positive coefficient of the ratio of total roads network to total population of trading partners. This connotes that one-point increase in the ratio of the quality of available roads network to total population, both in Nigeria and trading partners' countries, could reduce the trade costs associated with higher transportation and delivery costs, thus increase Nigeria's aggregate exports. These findings are in agreement with the results of Brooks (2008) and Korinek andSourdin (2009) who found that increase in the stock of infrastructure could bring about trade expansion.

The estimates of model 2 in Table 4.7a indicate positive and significant impact of institutional quality of both Nigeria and trading partners on Nigeria's aggregate exports with the quality of institutions of Nigeria having a higher impact than those of the trading partners. This signifies that a 1 percent improvement in the quality of institutional setup of the two trading countries in terms of low level of corruption, effective government, enforcement of rule of law, improved regulatory quality and political stability and absence of violence/terrorism could significantly increase aggregate exports by 12.81 percent and 2.27 percent, respectively. In addition, both models 1 and 2 in Table 4.7b show significant positive impact of improved institutional quality in Nigeria on its aggregate exports. In the case of model 1 in Table 4.7a, it is only Nigeria's quality of institution that exerts significant positive impact. The impact of improved institutions during the TFA (9.09 percent) is lower compared with before the TFA period (14.72 percent) as shown in model 1 of Table 4.7b.

Concerning the doing business indicators (DBI), the estimated results for model 2 in Table 4.7a revealnegative and significant impact of number of documents required to import. The result further indicates that one additional document required by the trading partners to import is attributed to higher trade costs and thus reduces Nigeria's aggregate exports by 0.17 percent. This result is related to the findings of Behar (2009) and Iwanow and Kirkpatrick (2009) that additional documents required by trading partners could reduce export performance. Conversely, in the same model, the positive coefficient of number of documents to export in Nigeria as shown in Table 4.7a is inconsistent with the theory. This implies that even though higher trade procedures associated with the required number of documents increase, Nigeria's aggregate exports also maintain an increasing trend. One major fact behind such case could be due to non-resistance of informal traders to all forms of restrictive measures towards reducing their activities. The informal traders boycott the required processes involved in cross-border trade as they fail to abide by the required sanitary and phytosanitary procedures. By implication, increasing trade procedures has no much impact on Nigeria's aggregate exports as the coefficient shows that a unit increase in the number of documents to export increases Nigeria's aggregate exports by 0.23 percent.

From the overall analysis, both ITCs and DTCscomponents are important determinants of Nigeria's aggregate exports to its major trading partners. In the full period estimations, the component of ITCs in the two models constitute 71 percent and 33 percent while the DTCs constitute 29 percent and 67 percent. However, in the pair-wise period estimations, the component of ITCs and DTCs for the two models constitute 33 percent and 67 percent each. From the estimates, the DTCs component on average exert greater impact (57.5 percent) than the ITCs component (42.5 percent).

Table 4.7b: Impact of ITCs and DTCs on Nigeria's Aggregate Exports before TFA Period

	Model 1 (sub-period i.e. if year <=2013)			Model 2 (sub-period i.e. if year <=2013)		
Dependent variable Aggregate exports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Aggregate GDP Nigeria (log)	14.810 (2.00)**	14.788 (2.23)**	15.166 (2.30)**	1.497 (0.20)	4.814 (0.82)	5.711 (0.96)
Aggregate GDP Partners (log)	0.397 (3.17)***	-3.156 (-1.41)	0.331 (1.33)	0.298 (2.70)***	-3.279 (-1.49)	0.189 (0.81)
Tariff	0.256 (3.04)***	-0.013 (-0.05)	0.202 (1.38)	0.292 (3.55)***	0.004 (0.02)	0.261 (1.81)*
Cost to export a container Nigeria (log)	-2.354 (-0.37)	-0.507 (-0.09)	-1.965 (-0.35)	-8.886 (-1.76)*	-6.028 (-1.40)	-7.480 (-1.71)*
Cost to import a container Partners (log)	2.971 (7.77)***	0.158 (0.14)	1.966 (2.90)***	3.130 (8.34)***	0.061 (0.06)	2.125 (3.16)***
Maritime transport (Nigeria)	-0.174 (-0.59)	-0.253 (-0.98)	-0.181 (-0.70)	0.137 (0.68)	0.054 (0.30)	0.118 (0.67)
Maritime transport (Partners)	0.026 (4.04)***	0.142 (2.58)**	0.034 (2.64)***	0.027 (3.92)***	0.157 (2.74)***	0.036 (2.59)**
Institutional quality (Nigeria)	11.793 (1.74)*	14.717 (2.49)**	12.464 (2.08)**	4.009 (0.77)	7.846 (1.77)*	5.656 (1.26)
Institutional quality (Partners)	0.528 (1.72)*	1.568 (0.86)	0.156 (0.29)	0.192 (0.61)	1.799 (0.99)	-0.308 (-0.55)
Real effective exchange rate (Nigeria)	0.033 (0.87)	0.033 (0.97)	0.032 (0.95)	0.049 (1.25)	0.049 (1.42)	0.052 (1.51)
Real effective exchange rate (Partners)	-0.007 (-0.43)	-0.003 (-0.15)	-0.006 (-0.34)	-0.012 (-0.68)	-0.006 (-0.27)	-0.008 (-0.40)
Ratio of road transport to population (Nigeria)	-	-	-	-0.115 (-0.54)	-0.005 (-0.03)	-0.006 (-0.03)
Ratio of road transport to population (Partners)	-0.0003 (-1.91)*	0.001 (2.14)**	0.0001 (0.50)	-0.0003 (-1.82)*	0.001 (2.01)**	0.0001 (0.48)
Days to export (Nigeria)	0.978 (1.15)	1.045 (1.41)	0.987 (1.32)	-	-	-
Days to import (Partners)	0.041 (1.60)	0.049 (0.99)	0.064 (1.72)*	-	-	-
Documents to import (Partners)	-	-	-	-0.027 (-0.28)	-0.028 (-0.12)	-0.013 (-0.08)
Constant	-406.585 (-1.75)*	-307.649 (-1.48)	-410.079 (-1.98)**	17.787 (0.08)	11.221 (0.06)	-106.629 (-0.57)
Over identification test (p-value)	0.918 (0.3380)			0.178 (0.6727)		
F-test		5.32 (0.0000)			5.37 (0.0000)	
Hausman test		23.38 (0.0543)			24.99 (0.0347)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	160	160	160	160	160	160
R-square	0.590	0.166	0.647	0.585	0.168	0.648

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1

The measure of aggregate exports includes the summation of agriculture, manufacturing and extractivesectors' exports. While the summation of industry and agriculture, value added (constant 2010 US$)gives rise to Aggregate GDP across the trading partners.

In the pair-wise period, variable "number of documents required to export"(models 1 and 2) while"Nigeria's ratio of total roads network to total population"(model 1) are omitted from the estimationbecause of collinearity.

Source: Author's computation.

4.3.1.2 Impact of DTCs and ITCs on Nigeria's Agricultural Exports to its major Trading Partners

The impact of domestic and international trade costs on Nigeria's agricultural exports is estimated for both full and pair-wise periods as shown in Tables 4.8a and 4.8b. For the two models in Table 4.8a, RE model is chosen. Model 1 in Table 4.8b chooses FE model while RE is chosen for model 2 based on the Hausman test statistics. The estimated results of model 1 in Table 4.8a reveal only cost to export a 20-foot container to be inconsistent with the expected sign. Also, in model 2, cost to import and number of documents required to export were revealed to have wrong signs among other statistically significant variables.However, model 1 in Table 4.8b reveals that number of days (time to export and import) proved to be statistically significant in explaining Nigeria's export of agricultural products but failed to follow the expected signs. Lastly, only cost to import a container in model 2 is inconsistent with the expected sign.

Following the trade costs classification, the estimates of the two modelsin Table 4.8a show that the ITCs component (maritime transport of trading partners)exerts significant positive impact.Also, model 1 shows negative impact of both Nigeria's REER and maritime transport but only REER of trading partners in the case of model 2. In the two models, the DTCs component (both institutional quality andratio of total roads network to total population of Nigeria) have significant positive impact while ratio of total roads network to total population of trading partners exerts significant negative impact. Although in model 1, cost to export a container has positive impact except number of days to export with negative impact. In model 2, cost to import a container, institutional quality of trading partners and number of documents required to export all have positive impact while cost to export has negative.

The two models in Table 4.8b also show the common ITCs component (Nigeria's maritime transport and REER of trading partners)with significant negative impactand Nigeria's REER in model 1. However, in model 2, maritime transport of trading partners has significant positive impact. The DTCs components (institutional quality of trading partners, number of days to export and import) in model 1 exert significant positive impact, in addition to institutional quality of Nigeria that is common in the two models. In model 2, cost to export a container and ratio of total roads network to

total population of trading partners exert negative impact except cost to import with significant positive impact on Nigeria's agricultural exports (See Table 4.8b).

The estimates of the two models in Table 4.8a indicate that both the agricultural sector GDP of exporter (Nigeria) and importer play an important role in promoting trade relations between Nigeria and its major trading partners though agricultural sector GDP of Nigeria have higher impact. Model 1 in Table 4.8b also reports similar results except in model 2 where only GDP of Nigeria is statistically significant. Significant negative impact of Nigeria's REER represents depreciation of the Naira against the trading partner's currency and associated with lower trade costs. Trade costs reduction as a result of deprecation could significantly improve the volume of agricultural goods exports.For instance, the estimates of model 1 in Tables 4.8a and 4.8b suggest that depreciation of Naira by 10 percent could bring about 1.9 percent and 0.7 percent increase in the volume of Nigeria's agricultural goods exports but reduce by 0.6 percent in case such a defensive or reactive action as a counter measure is embarked upon by other trading partners. For model 2 in Tables 4.8a and 4.8b, significant negative coefficient oftrading partners' REER connotes that exports of Nigeria's agricultural products could be reduced by 0.4 percent and 0.6 percent if the currency of the importing country is depreciated by 10 percent.

The fundamental role of maritime transport for exporter and importer as a facilitating tool to bilateral trade is also revealed in Tables 4.8a and 4.8b. In the case of Table 4.8a, the two models show that maritime transport oftrading partners is found to be significantly positive while that of Nigeria in model 1 exerts negative impact. Also in Table 4.8b, negative and significant impact of Nigeria's maritime transport is found in the two models but only that of trading partners has positive impact in model 2.These results relate to the background analysis whichshows that Nigeria's connectivity index is very low relative to those of its major trading partners. This is as a result of its infrastructure deficiency culminated in inefficient port infrastructure. By implication, Nigeria's trading activities tend to be deteriorating while improving those its trading partners.Generally, the results demonstrate that a point fall in the level at which Nigeria is connected to global shipping networks and accessible to global trade could reduceits export of agricultural products by 0.11 percent, 0.6 percent and 0.27 percent, respectively.Though, if improvement occur in the maritime status of the trading

partners, there is tendency that such action could stimulate Nigeria's agricultural goods exportsby 0.03 percent and 0.04 percent, respectively.

Additional increase in the available ratio of total roads network to total population is associated with reduction in trade costs as it reduces cost of transportation and consequently improve trading activities. From the estimates, the coefficients for ratio of total roads network to total population of Nigeria are found to be significantly positive for both models in Table 4.8a.Conversely, total roads network to total population of trading partners under the two models in Tables 4.8a and 4.8b is negative and statistically significant. This implies that Nigeria's agricultural exports could be enhanced if the ratio of its total roads network to total population is increased. It could also be hindered if the trading partners failed to record similar improvement.

Improved quality of institutions have tendency to promote trade relations between the trading partners. The estimates of model 2 in Table 4.8a and model 1 in Table 4.8b reveal that maintaining a better and sound institutional setup in Nigeria could boost its agriculturalgoods exports by 15.3 percent and 20.2 percent, and by 1.06 percentand 2.86 percent, respectively if such improvement exists in the importing countries. It is also clear from the estimates that the impact of sustaining improved and sound institutions in Nigeria tends to increase agriculturalgoods exports more than having a sound institution in the trading partners' countries.

Table 4.8a: Impact of ITCs and DTCs on Agricultural Sector Exports for the Period 2005-2016

	Model 1 (Full Period)			Model 2 (Full Period)		
Dependent variable Agricultural Exports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
AgriculturalSector GDP Nigeria (log)	39.564 (3.81)***	44.157 (3.72)***	41.714 (3.70)***	47.299 (4.26)***	51.381 (4.71)***	49.899 (4.72)***
Agricultural Sector GDP Partners (log)	0.181 (2.10)**	-1.031 (-0.54)	0.223 (1.67)*	0.199 (2.69)***	0.046 (0.04)	0.249 (1.68)*
Tariff	0.164 (2.61)***	0.035 (0.21)	0.101 (1.17)	0.184 (3.39)***	0.004 (0.03)	0.115 (1.40)
Cost to export a container (Nigeria)	0.019 (2.50)**	0.029 (2.77)***	0.026 (2.63)***	-0.003 (-2.70)***	-0.004 (-2.38)**	-0.003 (-2.44)**
Cost to import a container (Partners)	0.001 (3.28)***	-0.001 (-0.68)	0.001 (1.13)	0.002 (4.84)***	0.003 (2.88)***	0.003 (3.35)***
Maritime transport (Nigeria)	-0.088 (-1.54)	-0.117 (-1.74)*	-0.108 (-1.68)*	-0.011 (-0.24)	-0.015 (-0.34)	-0.013 (-0.30)
Maritime transport (Partners)	0.039 (6.65)***	0.031 (0.95)	0.033 (3.84)***	0.046 (7.91)***	0.005 (0.21)	0.041 (4.27)***
Institutional quality (Nigeria)	10.982 (2.52)**	14.824 (2.77)***	13.029 (2.61)***	14.782 (3.76)***	15.714 (4.07)***	15.291 (4.07)***
Institutional quality (Partners)	0.217 (0.78)	3.106 (1.97)**	0.225 (0.56)	0.777 (3.10)***	3.455 (2.70)***	1.059 (2.47)**
Real effective exchange rate (Nigeria)	-0.133 (-1.96)**	-0.219 (-2.40)**	-0.188 (-2.21)***	-0.032 (-1.17)	-0.039 (-1.50)	-0.035 (-1.38)
Real effective exchange rate (Partners)	-0.024 (-1.40)	-0.013 (-0.38)	-0.019 (-0.85)	-0.031 (-1.94)*	-0.055 (-1.90)*	-0.044 (-2.09)**
Ratio of road transport to population (Nigeria)	1.031 (3.58)***	1.331 (3.51)***	1.221 (3.51)***	0.616 (3.20)***	0.657 (3.55)***	0.652 (3.58)***
Ratio of road transport to population (Partners)	-0.001 (-4.22)***	-0.0002 (-0.15)	-0.001 (-3.00)***	-0.001 (-4.65)***	0.0002 (0.24)	-0.001 (-2.72)***
Days to export (Nigeria)	-1.457 (-2.40)**	-2.179 (-2.60)***	-1.960 (-2.51)**	-	-	-
Days to import (Partners)	-0.045 (-2.02)**	-0.033 (-0.93)	-0.031 (-1.16)	-	-	-
Documents to export (Nigeria)	-	-	-	0.378 (3.80)***	0.393 (3.73)***	0.364 (3.70)***
Documents to import (Partners)	-	-	-	-0.007 (-0.11)	-0.008 (-0.07)	0.049 (0.57)
Constant	-1076.931 (-3.81)***	-1183.048 (-3.66)***	-1142.396 (-3.71)***	-1241.248 (-4.14)***	-1340.478 (-4.57)***	-1309.674 (-4.59)***
Over identification test (p-value)	1.832 (0.1759)			3.282 (0.1938)		
F-test		2.73 (0.0003)			3.94 (0.0000)	
Hausman test		9.25 (0.7536)			8.31 (0.8226)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	220	220	220	220	220	220
R-square	0.469	0.013	0.716	0.583	0.022	0.743

Note: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1

Source: Author's computation.

For the DBI, the estimated results for model 1 in Table 4.8a revealsignificant negative impact of number of days required to export but number of days to import is insignificant. This suggests that extra one-day required to export a goodin Nigeria could reduce the volume of its agricultural goodsexports by 1.96 percent. Furthermore, model 2 in Tables 4.8a and 4.8b indicate that increasing the cost to export a 20-foot container by US$10 significantly reduces agricultural goodsexports of Nigeria to its major trading partners more before the TFA (89.3 percent) than with TFA (0.03 percent).This supports the earlier discussionin the background analysis that doing business in Nigeria is challenging,relative to its major trading partners. This is mainlydue to excessive requirements and unconducive regulatory environment(World Bank Group, 2016).Export procedures associated with more days and cost required to export a 20-foot container are expected to reduce bilateral trade relations between Nigeria and its major trading partners. However, the result is contrary to the theoretical proposition of H-O model which ignores all forms of trade restrictive measures and assumes free and unrestricted trade among countries. Martinez-Zarzoso and M´arquez-Ramos (2008) also found significant negative impact of cost to export a 20-foot container on bilateral exports while comparing the relative effect of inefficient trade procedures on exports of homogenous (which could include agricultural product) and differentiated product.

However, significant positive coefficients of cost, required number of days and documents to export are inconsistent with the theory (See models 1 and 2 in Table 4.8a and 4.8b). Also, the positive coefficients of cost and number of days to import in model 2 of Table 4.8a and model 1 in Table 4.8b signifyan increase in agricultural goodsexports of Nigeria. This result is counterintuitive except that there is higher preference for Nigeria's agricultural products by the trading partners to substitute for the domestically produced agricultural commodities. This could also be explained by the fact that most of the firms in the trading partners' countries rely heavily on agricultural products in their raw form (raw material) from Nigeria. Given this condition, increasing the required number of documents, days and cost to import as restrictive measures by the trading partnerscould possibly not reducing the volume of agricultural productsimported from Nigeria.

The estimations in Tables 4.8a and 4.8b show the differential impacts ratio of ITCs and DTCs on Nigeria's agricultural goods exports. ITCs component in the full period

estimations for the two models constitute 38.0 percent and 22.0 percent while constituting 43.0 percent in each model in the pair-wise period. However, the DTCs component in the full period constitute 62.0 percent and 78.0 percent whereas 57.0 percent in each model in the pairwise period. On average, DTCs component (63.5 percent) exerts greater impact than the ITCs (36.5 percent).

Table 4.8b: Impact of ITCs and DTCs on Agricultural Sector Exports for the Period before TFA

	Model 1 (sub-period i.e. if year <=2013)			Model 2 (sub-period i.e. if year <=2013)		
Dependent variable Agricultural Exports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Agricultural Sector GDP Nigeria (log)	35.280 (5.96)***	39.387 (7.47)***	37.413 (6.94)***	30.775 (3.21)***	27.280 (3.34)***	25.409 (3.17)***
Agricultural Sector GDP Partners (log)	-0.031 (-0.39)	2.426 (1.96)**	0.099 (0.73)	0.030 (0.39)	2.103 (1.65)	0.100 (0.66)
Tariff	0.188 (3.29)***	-0.088 (-0.75)	0.037 (0.49)	0.132 (2.49)**	-0.093 (-0.76)	0.032 (0.40)
Cost to export a container Nigeria (log)	-1.228 (-0.24)	0.390 (0.09)	-0.865 (-0.20)	-2.617 (-0.48)	-7.665 (-1.94)*	-8.928 (-2.27)**
Cost to import a container Partners (log)	2.159 (6.26)***	-0.344 (-0.38)	1.263 (2.43)**	1.892 (5.63)***	-0.419 (-0.45)	1.129 (2.02)**
Maritime transport (Nigeria)	-0.531 (-2.41)**	-0.614 (-3.17)***	-0.563 (-2.87)***	-0.419 (-2.08)**	-0.299 (-1.78)*	-0.274 (-1.65)*
Maritime transport (Partners)	0.047 (9.09)***	0.030 (1.31)	0.039 (4.71)***	0.043 (7.51)***	0.029 (1.21)	0.036 (3.66)***
Institutional quality (Nigeria)	18.054 (3.85)***	20.172 (4.88)***	18.907 (4.47)***	16.721 (3.60)***	14.751 (3.69)***	14.261 (3.60)***
Institutional quality (Partners)	0.089 (0.33)	2.864 (1.80)*	0.532 (1.25)	0.316 (1.23)	3.093 (1.87)*	0.360 (0.79)
Real effective exchange rate (Nigeria)	-0.045 (-1.31)	-0.066 (-2.17)**	-0.055 (-1.77)*	-0.061 (-1.68)*	-0.044 (-1.43)	-0.037 (-1.24)
Real effective exchange rate (Partners)	-0.046 (-2.42)**	-0.057 (-1.78)*	-0.052 (-2.15)**	-0.045 (-2.32)**	-0.064 (-1.96)**	-0.060 (-2.42)**
Ratio of road transport to population (Nigeria)	-	-	-	0.085 (0.43)	-0.023 (-0.14)	-0.061 (-0.38)
Ratio of road transport to population (Partners)	-0.001 (-3.86)***	0.0003 (0.51)	-0.001 (-2.70)***	-0.001 (-4.32)***	0.0002 (0.28)	-0.001 (-2.43)**
Days to export (Nigeria)	1.138 (2.30)**	1.185 (2.76)***	1.116 (2.52)**	-	-	-
Days to import (Partners)	-0.045 (-2.18)**	0.069 (1.74)*	0.012 (0.42)	-	-	-
Documents to import (Partners)	-	-	-	-0.092 (-1.10)	-0.161 (-0.83)	-0.034 (-0.25)
Constant	-870.909 (-5.22)***	-1023.173 (-6.80)***	-920.507 (-6.10)***	-731.983 (-2.62)***	-633.478 (-2.72)***	-536.575 (-2.35)**
Over identification test (p-value)	0.027 (0.8702)			4.324 (0.1151)		
F-test		4.52 (0.0000)			4.31 (0.0000)	
Hausman test		56.41 (0.0000)			17.83 (0.2145)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	160	160	160	160	160	160
R-square	0.735	0.177	0.744	0.718	0.177	0.742

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1
In the pair-wise period, variable "number of documents required to export" (models 1 and 2) while "Nigeria's ratio of total roads network to total population" (model 1) are omitted from the estimation because of collinearity.
Source: Author's computation.

4.3.1.3 Impact of DTCs and ITCs on Nigeria's Manufacturing Exports to its major Trading Partners

In determining the impact of domestic and international trade costs on Nigeria's manufacturedgoods exports to its major trading partners, the estimated results of the two models in Table 4.9a show that the Hausman chi-square is statistically insignificant.This confirms that FEestimates are rejected in favour of REestimates. This is similar in the case of model 2 in Table 4.9b. However, model 1 in Table 4.9b shows the choice of FE estimates based on significance of Hausman test statistics. The estimates of model 1 in Table 4.9a reveal that all the significant explanatory variables,except cost to export, follow their expected signs. In model 2, manufacturing sector GDP of Nigeria, cost to import, Nigeria's REER and number of documents to export do not conform to the expected signs. Model 1 in Table 4.9b indicates that none of the explanatory variables is wrongly signed, except in model 2 where both Nigeria's manufacturing sector GDP and REER are inconsistent with the theory. Under the two periods, the 'standard' gravity model variable that captures sectoral market size proxied by manufacturing sector GDP of Nigeria is positive in model 1 but negative and statistically significant in model 2.

In Table 4.9a, the estimated results in model 1 indicate that the component of ITCs (both Nigeria's REER and maritime transport) exert negative significant impactbut significant positive impact in model 2 on its manufacturing exports. The DTCs componentin model 1 (Nigeria's ratio of total roads network to total population,Nigeria's institutional quality and cost to export) exert positive whereas number of days to process export and institutional quality of trading partners exert negative and significant impact on Nigeria's manufactured goods exports. The DTCs component in model 2 (cost to export, institutional quality of Nigeria, ratio of total roads network to total population of Nigeria and partners) have significant negative impact though cost to import and number of documents to export exert positive impact on Nigeria's manufacturing goods exports.

On the other hand, the estimated results in Table 4.9b show that all the explanatory variables in model 1 have their expected signs. The only ITCs component in model 1 (Nigeria's maritime transport) exerts significant positive impact. In model 2, this indicator has negative impact while Nigeria's REER has positive impact on its

manufacturing exports. Apart from the DTCs component (cost to export a 20-foot container) common in the two models, time to export and import in model 1 and in model 2 (institutional quality of trading partners, number of documents to import and ratio of total roads network to total population of Nigeria) all exert negative impact. However, Nigeria's ratio of total roads network to total population in model 1 and institutional quality of Nigeria in model 2 have significant positive impact on manufactured exports.

Both in Tables 4.9a and 4.9b, model 1 estimates reveal only manufacturing sector GDP of Nigeriato bepositive and statistically significant but exerts significant negative impact on its manufacturing exports in model 2. This implies that Nigeria tends to export more of manufactured products which it has comparative advantage and export less of those it has comparative disadvantage. The estimate of model 1 in Table 4.9ashows only Nigeria's REER having significant negative impact. This connotes that depreciation of Naira by 10 percent increases its manufactured goods exports in the foreign markets by 2.93 percent. This is as a result of higher purchasing power of trading partners' currencies attributed to lower trade costs. However, appreciation of home currency denoted by the positive coefficient of Nigeria's REER in model 2 of Tables 4.9a and 4.9b is ascribed to higher trade costs. By implication, purchasing power of trading partners' currencies reduces and as well expected to reduce manufactured goods exports. But due to higher preference for Nigeria's manufacturing products in the foreign markets, the case is otherwise.

Maritime transport of exporter is highly a significant determinant of trade costs. For instance, improved orunimproved status of exporter's maritime transport has tendency to reduce or increase trade costs, thus boost exports volume or otherwise. Model 2 estimates under the two periods further show that one-point improvement in the status of Nigeria's maritime transport boosts its manufactured goods exports by 0.31 percent, especially during the TFA but reduce by 0.69 percent with one-point low in the status of Nigeria's maritime transportbefore the TFA period. This scenario is otherwise in the case of model 1 estimates under the two periods.

Table 4.9a: Impact of ITCs and DTCs on Manufacturing Sector Exports for thePeriod 2005-2016

	Model 1 (Full Period)			Model 2 (Full Period)		
Dependent variable Manufacturing Exports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Manufacturing Sector GDP Nigeria (log)	-25.004 (-1.85)*	19.470 (2.87)***	19.577 (2.86)***	-12.672 (-2.08)**	-61.933 (-2.56)**	-51.645 (-2.52)**
Manufacturing Sector GDP Partners (log)	0.291 (2.42)**	0.762 (0.55)	0.117 (0.53)	0.255 (2.70)***	1.763 (1.10)	0.222 (1.18)
Tariff	-0.092 (-1.13)	-0.287 (-1.15)	-0.112 (-0.80)	-0.037 (-0.55)	-0.032 (-0.10)	-0.051 (-0.40)
Cost to export a container (Nigeria)	-0.015 (-1.55)	0.017 (3.04)***	0.017 (3.15)***	-0.002 (-2.77)***	-0.004 (-2.19)**	-0.003 (-2.29)**
Cost to import a container (Partners)	0.001 (2.38)**	0.0003 (0.49)	0.001 (1.12)	0.001 (3.23)***	0.002 (1.85)*	0.002 (2.26)**
Maritime transport (Nigeria)	0.180 (1.77)*	-0.117 (-1.85)*	-0.111 (-1.74)*	0.124 (2.27)**	0.363 (2.68)***	0.312 (2.75)***
Maritime transport (Partners)	0.0003 (0.05)	0.006 (0.23)	0.009 (0.73)	-0.003 (-0.48)	-0.027 (-0.75)	0.005 (0.44)
Institutional quality (Nigeria)	-21.795 (-1.78)*	17.886 (2.73)***	17.195 (2.62)***	0.465 (0.09)	-23.862 (-1.79)*	-19.671 (-1.73)*
Institutional quality (Partners)	-0.304 (-0.98)	-0.232 (-0.18)	-0.894 (-1.72)*	-0.619 (-2.40)**	1.151 (0.68)	-0.367 (-0.75)
Real effective exchange rate (Nigeria)	0.417 (1.94)*	-0.291 (-2.68)***	-0.293 (-2.74)***	0.087 (1.39)	0.516 (2.40)**	0.432 (2.34)**
Real effective exchange rate (Partners)	0.029 (1.84)*	0.001 (0.06)	0.008 (0.47)	0.029 (2.13)**	-0.016 (-0.69)	0.005 (0.29)
Ratio of road transport to population (Nigeria)	-1.112 (-1.88)*	0.886 (3.02)***	0.878 (3.04)***	-0.491 (-2.91)***	-1.854 (-2.72)***	-1.563 (-2.75)***
Ratio of road transport to population (Partners)	-0.001 (-3.92)***	0.002 (2.52)**	-0.0003 (-0.97)	-0.001 (-5.08)***	0.002 (2.11)**	-0.001 (-2.00)**
Days to export (Nigeria)	1.282 (1.59)	-1.262 (-2.91)***	-1.276 (-2.99)***	-	-	-
Days to import (Partners)	0.006 (0.22)	-0.029 (-0.96)	-0.033 (-1.19)	-	-	-
Documents to export (Nigeria)	-	-	-	0.586 (6.50)***	0.886 (4.05)***	0.836 (4.36)***
Documents to import (Partners)	-	-	-	-0.237 (-3.30)***	-0.042 (-0.24)	-0.128 (-1.18)
Constant	651.508 (1.86)*	-522.779 (-2.85)***	-506.957 (-2.87)***	352.599 (2.27)**	1584 (2.57)**	1356.064 (2.57)**
Over identification test (p-value)	3.491 (0.1746)			0.875 (0.6458)		
F-test		5.48 (0.0000)			3.23 (0.0000)	
Hausman test		10.43 (0.6585)			7.79 (0.8011)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	220	220	220	220	220	220
R-square	0.126	0.061	0.338	0.390	0.037	0.486

Note: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1.

Source: Author's computation.

Increased stock of available roads network to total population both in the exporting and importing country is also related to trade costs reduction. This is confirmed by significant positive coefficient of ratio of total roads network to total population of Nigeria in model 1 of Table 4.9a and of the trading partners in Table 4.9b. The estimates suggest that additional increase in the stock of road network both in Nigeria and in the trading partners countries'could significantly reduce costs related to products delivery, thus increase the volume of Nigeria's manufactured goodsexports.These results are in line with the findings of Amiti and Javorcik (2008) and Arvis*et al.* (2015).However, there is no doubt that ratio of total roads network to population in Nigeria is extremely lower relative to those ofits trading partners, except Singapore and UAE (See Figure 2.2). While Nigeria's population is increasing overtime, there was no corresponding increase in the total available roads network, as the country could only record 0.001. This createsa greater burden on the available roads in the country and in effect increase transportation and delivery costs.Therefore, low ratio of roads network to total population as indicated by the estimates of model 2 in Table 4.9a reflect higher trade costs. This is clear from the estimated results that low ratio of roads network to total population in Nigeria has greater impact of reducing manufactured goods exports than low ratio of roads network to total population in the trading partners countries'.

A very weak institutional setup tends to hamper trade flows. In effect, high levels of corruption, inefficient governance and non-implementation of rule of law and inconsistency of regulatory environment in a country all concur to generate a negative impact on trade. These are also impediments to trade flows. For instance, significant negative coefficients of Nigeria's institutional quality in model 2 of Table 4.9a and that of the trading partners in model 2 of Table 4.9b reflect the existence of unimproved and non-standardized institutions,both in the exporting and importing countries, thus hinder Nigeria's manufacturedgoods exports. A similar result was also established by Iwanow (2011) that except countries with improved institutional environment could exportrelatively more in the more complex industry. On the other hand, maintaining an improved institutional setup in Nigeria could stimulate manufacturedgoods exports. This is shown by the estimates of model 1 in Table 4.9a and model 2 in Table 4.9b.

With respect to DBI, additional number of days to export constrains manufacturing exports than extra one-day required to import. According to the FE estimates of model

1 in Table 4.9b, the impact of a one-day increase on the average days required to export in Nigeria reducesits manufactured goods exports by 1.62 percent, whereas the impact of one-day increase on the average days required to import by the trading partners reduces Nigeria's manufactured exports by 0.09 percent. Comparatively, one additional number of days mandated to complete exporting procedures before the TFA period hindered manufacturedgoods exports (1.62 percent) more than during the TFA (1.28 percent). In the case of documents required, the estimates of model 2 in Table 4.9b showthat only number of documents required to import is negative and statistically significant. This is an indication that before the TFA, there was high level of inefficiency in the trading partner's border. This makes theNigeria's exporters to face with many hurdles associated with border formalities in the importing countries and consequently reduces manufactured goods exports.

Also, higher cost to export a 20-foot container lowers propensity to export. For instance, estimates of the two models in Table 4.9band model 2 in Table 4.9a show that US$1 increase in the cost to export a 20-foot container is capable of inhibiting Nigeria's manufacturing exports by about 29.06 percent, 8.51 percent and 0.003 percent, respectively. These results also corroborate with the findings of Iwanow and Kirkpatrick (2009) and Ueki (2015) that lack of trade faciliatation reforms could hinder export performance. By comparison, the impact of US$1 increase in the cost to export a 20-foot container reduces Nigeria's manufacturing exports considerably more before the TFA period (8.51 percentand 29.06 percent) than during the TFA (0.003 percent). However, significant positive coefficient of cost to export a 20-foot container in model 1 and number of document to export in model 2 of Table 4.9aare inconsistent with the theory. This could also be explained by the increasing level of informal trading activities in the country.

In the full period estimations, the differential impact ratio of ITCs component under the two models recorded 29.0 percent and 25.0 percent while recorded 20.0 percent and 29.0 percent in the pair-wise. The DTCs component under the full period also recorded 71.0 percent and 75.0 percent. In the pair-wise, however, the DTCs recorded 80.0 percent and 71.0 percent, respectively. Generally, the overall analysis shows higher impact ratio of DTCs component (74.0 percent) than ITCs component (26.0 percent) on Nigeria's manufacturing exports.

Table 4.9b:Impact of ITCs and DTCs on Manufacturing Sector Exports for the Period before TFA

	Model 1 (sub-period i.e. if year <=2013)			Model 2 (sub-period i.e. if year <=2013)		
Dependent variable Manufacturing Exports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Manufacturing Sector GDP Nigeria (log)	21.307 (3.48)***	4.815 (1.86)*	4.589 (1.82)*	-22.468 (-2.75)***	-22.856 (-4.54)***	-23.126 (-4.47)***
Manufacturing Sector GDP Partners (log)	0.255 (1.65)*	-0.571 (-0.38)	0.001 (0.01)	0.225 (2.06)**	0.529 (0.42)	0.088 (0.38)
Tariff	-0.107 (-1.12)	0.001 (0.00)	-0.103 (-0.68)	-0.058 (-0.79)	-0.169 (-0.79)	-0.157 (-1.16)
Cost to export a container Nigeria (log)	-18.083 (-1.24)	-29.061 (-2.95)***	-28.230 (-2.89)***	-4.222 (-0.26)	-7.936 (-2.04)**	-8.505 (-2.15)**
Cost to import a container Partners (log)	1.449 (2.96)***	-0.094 (-0.08)	0.968 (1.26)	1.585 (4.16)***	-0.129 (-0.12)	0.936 (1.34)
Maritime transport (Nigeria)	-0.263 (-0.69)	0.520 (2.46)**	0.505 (2.37)**	-0.744 (-2.25)**	-0.676 (-3.31)***	-0.688 (-3.32)***
Maritime transport (Partners)	0.010 (1.18)	0.003 (0.11)	0.017 (1.24)	0.001 (0.16)	-0.006 (-0.20)	0.010 (0.75)
Institutional quality (Nigeria)	25.982 (2.98)***	6.095 (1.37)	5.234 (1.16)	10.729 (1.74)*	11.047 (2.90)***	10.169 (2.61)***
Institutional quality (Partners)	-0.348 (-0.85)	-3.103 (-1.60)	-1.428 (-2.27)**	-1.114 (-3.47)***	-1.406 (-0.85)	-1.579 (-2.70)***
Real effective exchange rate (Nigeria)	-0.238 (-2.42)**	0.032 (0.68)	0.018 (0.39)	0.089 (0.82)	0.114 (2.61)***	0.114 (2.53)**
Real effective exchange rate (Partners)	0.052 (2.22)**	0.038 (1.59)	0.025 (1.18)	0.051 (2.79)***	0.031 (1.52)	0.029 (1.63)
Ratio of road transport to population (Nigeria)				-1.297 (-3.05)***	-1.336 (-5.65)***	-1.357 (-5.60)***
Ratio of road transport to population (Partners)	-0.001 (-2.86)***	0.002 (2.43)**	-0.0001 (-0.21)	-0.001 (-4.31)***	0.002 (3.30)***	-0.0001 (-0.22)
Days to export (Nigeria)	-0.195 (-0.24)	-1.622 (-3.19)***	-1.608 (-3.15)***	-	-	-
Days to import (Partners)	0.017 (0.50)	-0.085 (-1.66)*	-0.058 (-1.39)	-	-	-
Documents to import (Partners)	-	-	-	-0.377 (-3.73)***	-0.317 (-1.54)	-0.274 (-1.70)*
Constant	-325.906 (-2.01)**	149.547 (1.88)*	128.544 (1.85)*	739.317 (2.39)**	780.415 (5.03)***	798.013 (5.13)***
Over identification test (p-value)	1.485 (0.2229)			0.087 (0.7683)		
F-test		5.90 (0.0000)			6.65 (0.0000)	
Hausman test		23.86 (0.0476)			4.41 (0.9925)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	160	160	160	160	160	160
R-square	0.216	0.102	0.311	0.509	0.055	0.415

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1. In the pair-wise period, variable "number of documents required to export" (models 1 and 2) while "Nigeria's ratio of total roads network to total population" (model 1) are omitted from the estimation because of collinearity.

Source: Author's computation.

4.3.1.4 Impact of DTCs and ITCs on Nigeria's Extractive Sector Exports to its major Trading Partners

Tables 4.10a and 4.10b present the estimated results of the impact of domestic and international trade costs on extractive sector exports, both for full and pair-wise periods, using PPML and fixed effects PPML estimators. Specifically, the two estimators were designed to capture the presence of zero trade flows rather than dropping them. To control for unobserved heterogeneity between country pairs and to account for importer specific fixed effects, fixed effect PPML is interpreted in each of the models. Both models 1 and 2 in Tables 4.10a and 4.10b show that all the explanatory variables are statistically significant at 1 percent confidence level, though extractive sector GDP of trading partners is inconsistent with the expected sign both in the full and pair-wise periods estimations.

Model 1 estimates for full and pair-wise periods reveal that the ITCs component (both Nigeria's and trading partners' REER) are inconsistent with their theoretical expectation. While the DTCs component (cost to export and import a container) in the full period estimationandonly cost to import a container in the pair-wise period estimation do not follow their expected signs. In the case of model 2, REER of Nigeria and the partners are the ITCs component that do not conform with the theory in the pair-wise period but only that of Nigeria in the full period estimations. More so, the DTCs component in the full period estimation (cost to import a container and number of document to export) and only cost to import a container in the pair-wise period are inconsistent with their expected signs.

For both models 1 and 2, the fixed effect PPML estimates in the full and pair-wise periods surprisingly indicate positive significant of extractive sector's GDP of Nigeria while that of the trading partners exerts negative and significant impact on Nigeria's exports of extractive products. This connotes that Nigeria, being a rich country in terms of mineral resources, particularly crude oil, could significantly export more of such extractive products. However, well-endowed trading partners with some of these extractive resources could significantly import less. This indeed corroborates the argument of H-O model, which states that conditions of supply alone determine the pattern of international trade.The estimates for the two models in each of Tables 4.10a and 4.10b also indicate the impact of tariff as a deterrent to bilateral exports, as tariff

rate imposed by the trading partners on Nigeria's primary products is found to have a significant negative impact on exports of Nigeria's extractive sector.

Appreciation of trading partners' REER is expected to reduce trade costs as indicated in the two models of Table 4.10b and model 1 in 4.10a. This is also an indication that Nigeria's export of extractive products is highly competitive as the currencies of trading partners gain more strength. Significant impact of increasing extractive products exports before the TFA period (0.02 percent) is relatively higher than during the TFA (0.001 percent). The estimates of the two models in Tables 4.10a and 4.10b show that Nigeria's REER maintains an increasing trend with exports of extractive products. Theseareinconsistent with the theory as it is associated with higher trade costs. The argument could be that the worldwide demand for extractive products, particularly crude oil, is inelastic. Since oil endowment is not evenly distributed across countries in the world, non-oil producing countries tend to increase their demand even though exporter's exchange rate is appreciative. On the other hand, depreciation of trading partners' REER indicates a loss in export competitiveness of Nigeria's extractive products (see model 2 in Table 4.10a).

The positive coefficient of the ratio of total roads network to total population of both Nigeria and the trading partners revealed in model 1 of full period implies that further improvement in the ratio of roads stock to total population, bothin Nigeria and the trading partners' countries, could boost exports of Nigeria's extractive products. This is also supported by the positive coefficient of the ratio of total roads network to total population of trading partners in model 1 of pair-wise period and model 2 of both periods under consideration. However, exports of Nigeria's extractive products could be reduced by 0.02 percent and 0.21 percent with a reduction in the ratio of total roads network to total population of Nigeria by 1 point (See Table 4.10b).The estimates of models 1 and 2 under the two periods also show that the quality of institutions both in Nigeria and the trading partners are all found to be positive and exert significant impact on exports of Nigeria's extractive products.From the estimates, it is understood that development of well improved and standardized institutions in Nigeria with similar case in the trading partners' countries could enhance Nigeria's exports of extractive products. Although, there is differing impact on exports of Nigeria's extractive sector asmaintaining an improved institutions in Nigeria exerts greater impact than that of the trading partners.

Table 4.10a: Impact of ITCs and DTCs on Extractive Sector Exports for the Period 2005-2016

	Model 1 (Full Period)		Model 2 (Full Period)	
Dependent variable Extractive Exports	Pooled PPML	Fixed Effect PPML	Pooled PPML	Fixed Effect PPML
Extractive Sector GDP Nigeria (log)	7.339 (541.53)***	7.037 (503.14)***	3.426 (259.43)***	4.844 (352.59)***
Extractive Sector GDP Partners (log)	0.558 (1273.07)***	-1.328 (-372.80)***	0.651 (1628.58)***	-0.644 (-198.88)***
Tariff	0.043 (189.04)***	-0.132 (-261.41)***	0.008 (34.55)***	-0.179 (-354.67)***
Cost to export a container (Nigeria)	-0.0002 (-121.62)***	0.0003 (123.94)***	-0.001 (-549.63)***	-0.0002 (-55.87)***
Cost to import a container (Partners)	0.001 (1078.92)***	0.001 (199.24)***	0.001 (931.67)***	0.0002 (83.61)***
Maritime transport (Nigeria)	-0.059 (-247.20)***	-0.059 (-239.63)***	-0.006 (-24.99)***	-0.027 (-104.61)***
Maritime transport (Partners)	-0.0003 (-12.97)***	-0.0002 (-2.15)**	-0.001 (-40.15)***	-0.007 (-70.89)***
Institutional quality (Nigeria)	4.736 (299.26)***	4.308 (267.27)***	2.584 (170.79)***	2.975 (195.66)***
Institutional quality (Partners)	-0.551 (-568.34)***	0.851 (150.96)***	-0.138 (-166.34)***	1.178 (214.54)***
Real effective exchange rate (Nigeria)	0.034 (377.34)***	0.029 (319.95)***	0.026 (256.18)***	0.025 (234.55)***
Real effective exchange rate (Partners)	-0.005 (-116.62)***	0.001 (7.45)***	0.0003 (6.53)***	-0.002 (-20.81)***
Ratio of road transport to population (Nigeria)	0.163 (109.12)***	0.038 (24.54)***	-0.203 (-135.88)***	-0.222 (-146.95)***
Ratio of road transport to population (Partners)	0.003 (619.27)***	0.008 (148.09)***	0.003 (633.66)***	0.015 (260.25)***
Days to export (Nigeria)	-0.051 (-368.66)***	-0.031 (-215.22)***	-	-
Days to import (Partners)	-0.049 (-521.82)***	-0.056 (-487.91)***	-	-
Documents to export (Nigeria)			0.020 (56.15)***	0.084 (204.65)***
Documents to import (Partners)			0.079 (305.91)***	-0.081 (-194.21)***
Constant	-184.529 (-585.10)***		-89.861 (-289.10)***	
No. of cross sections	20	20	20	20
No. of Observations	240	240	240	240
Log likelihood	-3033933.8	-966134.17	-3192551.4	-1090544.1
Pseudo R-square	0.526	-	0.502	-

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1.

Extractive sector is made up of mineral fuels, lubricants and related, metal ores, quarrying and othermining products. Export of mineral fuels, lubricants and related was used for the analysis but mineralor oil GDP could not be found as most of the trading partners are not oil producing countries. Rather, the researcher subtracted the manufacturing value added from the industry value added (constant 2010US$) to arrive at extractive value added.

Source: Author's computation.

The status of maritime transport of Nigeria and of the trading partners in the full period modelsare found to be negative and statistically significant in explaining exports of Nigeria's extractive sector. Although the estimates show greater impact of reducing exports of extractive products due to unimproved status of Nigeria's maritime transport than that of the trading partners. In the pair-wise period models, significant negative impact of maritime transport of trading partners is also exerted while that of Nigeria exerts significant positive impact.

As regard the DBI, the background analysis reveals that due to its inefficient trade procedures,the requirements for trading in and out of Nigeria both before and during the TFA period are extremely higher compared with those its major trading partners. It is also clear thatNigeria's export of mineral fuels, lubricants and related materials dominates all other commodities which it exports toits major trading partners (See Table 2.7). Therefore, excessive requirements in terms of documents, time (days) and costs required to complete the four predefined stages for exporting in the Nigerian ports are expected to constrain export of such products. This is supported by the estimated results in model 1 whichreveal that number of days (time) to export and import under the two periods are negative and statistically significant in explaining exports of Nigeria's extractive sector with marginal difference between the two coefficients.The estimates further suggest that increasing the number of days required to complete export procedures reduces Nigeria's extractive products exports more before the TFA (0.044 percent) than during the TFA period (0.031 percent). Conversely, additional days required by the trading partners to complete import processes reduces Nigeria's extractive products exports less before the TFA (0.043 percent) than during the TFA period (0.056 percent). In this case, a more related study is Sadikov (2007). The author however used number of signatures and registration procedures while concludes that country specific characteristics matter.

For model 2, the estimated results in Table 4.10b indicate that the required number of documents to export and import in the pair-wise period are both negative and statistically significant. Further, the estimate shows a greater impact of additional documents required in Nigeriato export (one more document) on extractive exports (a decrease in extractive export by 0.62 percent) than additional documents required to import by the trading partners (a decrease in extractive export by 0.10 percent).Also in the full period estimation, number of documents required to imports exerts negative

impact. In effect, one additional document required by the trading partnersto import generates a decrease in the exports of Nigeria's extractive products. This could be as a result of inefficiency in the partner's border. Thus, exporters are faced with many hurdles associated with border formalities of the trading partners.

Model 2 estimates in Table 4.10ashow that cost to export exerts negative impact, indicating the propensity to reduce Nigeria's extractive productsexports with an increase in the cost to export a 20-foot container. In Table 4.10b,however, the two models indicatesignificant negative impact of cost to export a 20-foot container.By comparison, the estimates of model 2 under the two periods show that significant impact of cost to export on extractive sector export was higher before the TFA (0.002 percent)than during the TFA period(0.0002 percent).Finally, model 1 estimates of the full period reveal positive impact of cost to export and import and the same for the pair-wise period estimation except cost to export. While in model 2, cost to import and number of documents to export in the case of full period estimation but cost to import in the pair-wise period are all counterintuitive and this result could be more of statistical curiosity.

The ITCs component in each of the two models under the full and pair-wise periods' estimations constitute 38.0 percent, while the DTCs recorded 62.0 percent. Therefore, the differential impact ratio of DTCs component is higher relative to that of the ITCs on extractive sector exports.

Table 4.10b:Impact of ITCs and DTCs on Extractive Sector Exports for thePeriod before TFA

	Model 1 (sub-period i.e., if year <=2013)		Model 2(sub-period i.e., if year <=2013)	
Dependent variable Extractive Exports	Pooled PPML	Fixed Effect PPML	Pooled PPML	Fixed Effect PPML
Extractive Sector GDP Nigeria (log)	3.506 (112.14)***	4.775 (150.11)***	3.082 (100.59)***	4.360 (139.54)***
Extractive Sector GDP Partners (log)	0.593 (1093.45)***	-1.017 (-236.15)***	0.669 (1455.67)***	-0.602 (-145.25)***
Tariff	0.122 (464.05)***	-0.102 (-183.47)***	0.081 (302.52)***	-0.127 (-228.37)***
Cost to export a container Nigeria (log)	-0.004 (-137.64)***	-0.002 (-75.48)***	-0.003 (-137.06)***	-0.002 (-89.01)***
Cost to import a container Partners (log)	0.002 (1232.07)***	0.0002 (66.78)***	0.002 (1126.84)***	0.0002 (56.32)***
Maritime transport (Nigeria)	0.141 (193.32)***	0.032 (43.11)***	0.115 (161.66)***	0.031 (43.63)***
Maritime transport (Partners)	0.008 (291.97)***	-0.001 (-5.31)***	0.008 (307.84)***	-0.004 (-28.09)***
Institutional quality (Nigeria)	0.521 (19.37)***	2.124 (78.50)***	0.863 (32.66)***	2.188 (82.09)***
Institutional quality (Partners)	-0.537 (-404.10)***	0.554 (71.94)***	-0.042 (-39.84)***	0.409 (53.17)***
Real effective exchange rate (Nigeria)	0.056 (318.43)***	0.048 (263.35)***	0.053 (304.88)***	0.046 (261.36)***
Real effective exchange rate (Partners)	0.009 (146.57)***	0.017 (186.70)***	0.014 (223.56)***	0.020 (216.79)***
Ratio of road transport to population (Nigeria)	0.546 (111.21)***	-0.015 (-2.99)***	0.207 (42.90)***	-0.207 (-41.81)***
Ratio of road transport to population (Partners)	0.004 (677.45)***	0.005 (90.68)***	0.004 (696.33)***	0.007 (123.43)***
Days to export (Nigeria)	-0.079 (-415.34)***	-0.044 (-223.56)***	-	-
Days to import (Partners)	-0.040 (-331.94)***	-0.043 (-210.36)***	-	-
Documents to export (Nigeria)	-	-	-1.138 (-432.84)***	-0.617 (-228.13)***
Documents to import (Partners)	-	-	0.109 (330.99)***	-0.104 (-113.83)***
Constant	-103.976 (-129.17)***		-83.484 (-105.05)***	
No. of cross sections	20	20	20	20
No. of Observations	180	180	180	180
Log likelihood	-2028852.9	-598296.93	-2038035.2	-614756.84
Pseudo R-square	0.629	-	0.627	-

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1.

Extractive sector is made up of mineral fuels, lubricants and related, metal ores, quarrying and other mining products. Export of mineral fuels, lubricants and related was used for the analysis but mineralor oil GDP could not be found as most of the trading partners are not oil producing countries. Rather,the researcher subtracted the manufacturing value added from the industry value added (constant 2010US$) to arrive at extractive value added.

Source: Author's computation.

4.3.2 Determining the Impact of DTCs and ITCs on Nigeria's Imports

4.3.2.1 The Impact of DTCs and ITCs on Nigeria's Aggregate Imports from its major Trading Partners

In order to have a better understanding of the trade dynamics between Nigeria and its major trading partners, the same analysis was carried out on Nigeria's aggregate and disaggregate imports from the trading partners. Tables 4.11a and 4.11b show the estimated results of the impact of domestic and international trade costs on Nigeria's aggregate imports from its major trading partners for both full and the pair-wise periods. Based on Hausman test statistics, each of the two models in Tables 4.11a and 4.11b chooses RE model. From the estimated results in Table 4.11a, none of the significant variables in model 2 turns out wrong sign but only cost to import has a wrong sign in model 1. Also, model 1 in Table 4.11b shows that only number of days to export is inconsistent with the expected sign while cost to import a container and trading partners' REER turned out with wrong signs in model 2.

The estimates of models 1 and 2 in Table 4.11a reveal that the component of ITCs (tariff, Nigeria's maritime transport and Nigeria's REER) exert negative impact but none of them has significant positive impact. The DTCs component in models 1 and 2 (both institutional quality and ratio of roads network to total population of Nigeria) together with cost to import in model 1 have significant positive impact while only cost to export has negative impact in the two models. Also, significant negative impact of number of days to import is revealed in model 1 and required number of documents to export in model 2. Similarly, the common ITCs component in Table 4.11b shows significant positive impact of maritime transport of trading partners in the two models. In addition, significant negative impact of both Nigeria's REER and maritime transport is shown in model 1. Tariff is shown with negative impact while trading partners' REER with positive impact in model 2. The DTCs component common with the two models in Table 4.11b indicates that institutional quality of Nigeria exerts significant positive impact. Significant positive impact of number of days to export is shown in model 1 while ratio of total roads network to total population of Nigeria in model 2.

Similar to the gravity model literature discussed in the exports models, all the indicators either attributed to higher trade costs or lower trade costs still hold in the

imports models except REER. In the imports models, depreciation of importer's REER/appreciation of exporter's REER (more local currency per unit of foreign currency) is associated with higher trade costs while appreciation of importer's REER/depreciation of exporter's REER (less local currency per unit of foreign currency) tend to reduce trade costs. Estimates in each of the two models in Tables 4.11a and 4.11b indicate that GDP of both Nigeria and the trading partners were found to have significant positive impact on Nigeria's aggregate imports with the GDP of Nigeria having a greater impact than that of the trading partners thereby predicting differing impact on bilateral imports. This result agrees with the findings of De (2007), Martinez-Zarzoso*et al*. (2007), Bugel (2010) and Singh*et al*. (2015).

Since tariff is a trade restrictive measure imposed by the importing countries in order to protect their domestic economy, thus making Nigeria's tariff rates on primary products, manufactured products and all products to be significantly higher. Double digits high tariff rates in Nigeria could be the result of a number of additional duties on imports and irregularities in taxes on imported goods.Overtime, Nigeria, an import dependent country has been recording double digitstariff rates relative to those of its major trading partners, except India (See Figure 2.1a, 2.1b & 2.1c). This background analysis supports theresults in Table 4.11a, where the two models presented indicate significant negative impact of tariff on aggregate imports. Although, in Table 4.11b, significant negative impact is only shown in model 2. This impliesthat 1 percent increase in tariff rate imposed on imported goods from trading partners could hinder Nigeria's aggregate imports by about 0.52 percent, 0.28 percent and 1.13 percent, respectively. Comparing the coefficients of the two periods under consideration, it is seen from the estimated results that tariff rate imposed on aggregate imports before the TFA is higher compare with tariff rate imposed during the TFA period.

In the importing country, fall in REER also signifies depreciation but associated with higher trade costs as price of foreign (or imported) goods becomes very costly in the home markets. Depreciation of local currency brings about substantial reduction in imported goods demanded in the home country. This is supported by the estimated results of models 1 and 2 in Table 4.11a where Nigeria's REER show significant negative impact on aggregate imports. Equally, model 1 in Table 4.11b reveals significant negative impact of Nigeria's REER on aggregate imports. Comparing the estimates of model 1 in Tables 4.11a and 4.11b, it is seen that depreciation of Nigeria's

currency before the TFA period has lower impact as it reduces aggregate imports by (0.03 percent) than during the TFA period (0.05 percent). The results further suggest that depreciation of local currency (Naira) against that of the trading partners by 10 percent could reduce aggregate imports by 0.5 percent, 0.2 percent and 0.3 percent, respectively.

However, the result of model 2 in Table 4.11b shows significant positive coefficient of trading partners' REER. This represents appreciation of foreign currency and attributed to higher trade costs as importers (i.e., Nigeria) would require more of Naira for a unit of foreign currency. In this case, exports of the trading partners' become uncompetitive as price become very costly in Nigerian markets, thereby reduce the purchasing power of Naira. The estimate therefore shows that appreciation of trading partners' REER could significantly increase aggregate imports of Nigeria which is not theoretically supported.This could be explained by low capacity of Nigeria to produce some of the imported goods (such as machinery and transport equipment, chemicals and related products among others). Importing such commodities from trading partners that appreciated its currency might not discourage Nigeria's aggregate imports.

It is also understood that effective participation of a country in global trade could be hindered if such country has low connectivity to maritime shipping networks. This is supported by unimproved status of Nigeria's maritime transport, showing a significant negative impact on Nigeria's aggregate imports in Table 4.11a. The analysis further suggests the possibility of reducing aggregate imports by 0.24 percentand 0.16 percent if Nigeria fails to develop its maritime shipping networks as shown in models 1 and 2, respectively. In Table 4.11b, however, the estimated results in the two models suggest that Nigeria's aggregate import could increase marginally by 0.01 percent if the condition of maritime transport of the trading partners is improved.Similarly, models 1 and 2 in Table 4.11a and model 2 in Table 4.11b all indicate that aggregate imports could be increased as there is significant improvement in the ratio of total roads network to total population of Nigeria.Under the two models in Tables 4.11a and 4.11b, quality of institution in Nigeria has significant positive impact on its aggregate imports.This connotes that nature of institutions of the trading partners does not matter butwell-structured institutions in Nigeria could possibly improve its aggregate imports.

Table 4.11a: Impact of ITCs and DTCs on Nigeria's Aggregate Imports for the

Period 2005-2016

	Model 1 (Full Period)			Model 2 (Full Period)		
Dependent variable Aggregate Imports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Aggregate GDP Nigeria (log)	13.018 (3.95)***	13.483 (5.29)***	13.505 (5.26)***	13.286 (3.81)***	11.811 (4.65)***	11.636 (4.53)***
Aggregate GDP Partners (log)	0.505 (10.99)***	0.729 (1.12)	0.580 (5.05)***	0.487 (10.62)***	0.571 (0.93)	0.569 (5.00)***
Tariff	-0.526 (-2.82)***	-0.499 (-3.49)***	-0.515 (-3.54)***	-0.524 (-2.84)***	-0.267 (-2.02)**	-0.283 (-2.12)**
Cost to import a container (Nigeria)	0.001 (1.36)	0.002 (2.12)**	0.002 (2.10)**	-0.001 (-2.89)***	0.0001 (0.36)	0.0001 (0.33)
Cost to export a container (Partners)	0.0001 (0.43)	-0.0004 (-1.71)*	-0.0004 (-1.72)*	0.0004 (1.64)	-0.0004 (-1.70)*	-0.0004 (-1.82)*
Maritime transport (Nigeria)	-0.239 (-3.28)***	-0.234 (-4.21)***	-0.239 (-4.22)***	-0.227 (-3.51)***	-0.159 (-3.44)***	-0.161 (-3.43)***
Maritime transport (Partners)	0.011 (4.40)***	-0.010 (-1.06)	0.002 (0.44)	0.012 (4.90)***	-0.011 (-1.25)	0.002 (0.39)
Institutional quality (Nigeria)	4.375 (1.87)*	4.678 (2.60)***	4.571 (2.51)**	5.400 (2.30)**	3.300 (1.96)**	3.177 (1.86)*
Institutional quality (Partners)	-0.191 (-1.79)*	1.006 (2.25)**	-0.034 (-0.18)	-0.199 (-1.83)*	0.867 (2.08)**	-0.099 (-0.52)
Real effective exchange rate (Nigeria)	-0.045 (-2.31)**	-0.051 (-3.35)***	-0.049 (-3.17)***	-0.028 (-1.92)*	-0.022 (-2.11)**	-0.020 (-1.92)*
Real effective exchange rate (Partners)	0.010 (1.48)	0.005 (0.77)	0.007 (1.17)	0.008 (1.28)	0.004 (0.74)	0.006 (1.05)
Ratio of road transport to population (Nigeria)	0.162 (3.18)***	0.158 (3.96)***	0.164 (4.11)***	0.061 (1.13)	0.094 (2.35)**	0.095 (2.34)**
Ratio of road transport to population (Partners)	-0.00004 (-0.79)	0.00003 (0.09)	-0.0002 (-1.15)	-0.00004 (-0.75)	0.00002 (0.07)	-0.0002 (-1.26)
Days to import (Nigeria)	-0.094 (-1.90)*	-0.078 (-2.12)**	-0.084 (-2.20)**	-	-	-
Days to export (Partners)	-0.003 (-0.17)	-0.027 (-1.44)	-0.017 (-1.02)	-	-	-
Documents to import (Nigeria)	-	-	-	0.059 (1.32)	0.038 (1.06)	0.032 (0.92)
Documents to export (Partners)	-	-	-	-0.029 (-0.58)	-0.133 (-2.48)**	-0.106 (-2.14)**
Constant	-346.439 (-4.02)***	-363.426 (-5.45)***	-360.683 (-5.37)***	-342.836 (-3.66)***	-316.164 (-4.63)***	-311.835 (-4.50)***
Over identification test (p-value)	0.314 (0.5753)			0.269 (0.6038)		
F-test		10.38 (0.0000)			11.98 (0.0000)	
Hausman test		9.51 (0.7332)			14.17 (0.3623)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	220	220	220	220	220	220
R-square	0.653	0.265	0.719	0.661	0.209	0.702

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1. The measure of aggregate imports includes the summation of agriculture, manufacturing and extractivesectors' exports. While the summation of industry and agriculture, value added (constant 2010 US$) givesrise to Aggregate GDP across the trading partners.

Source: Author's computation.

With respect to DBI, the estimated results of the two models in Table 4.11a show that increasing the cost to export a 20-foot container in the trading partners' countries could bring about a reduction in aggregate imports. Although the impact of such reduction is marginal. However, significant positive coefficient of cost to import a container in Nigeria for model 1 in Table 4.11a and model 2 in Table 4.11b are not theoretically supported. This is because high cost to import is expected to hinder imports. But if substitution effect for importation is high such that consumers in Nigeria create more preferences for the imported products, increasing cost to import a 20-foot container might not be a hindrance to Nigeria's aggregate imports. In addition, more number of documents the trading partners required to export exposed exportersto high trade costs associated with bureaucratic procedures. This could also reduce the propensity to import and as well lower the volume of goods imported in Nigeria (see model 2 in Table 4.11a).

In terms of number of days required to import, it could be seen from Table 2.3 in the background analysis that despite the implementation of TFA, in which the requirements for trading across borders have been significantly reduced, such requirements for some of the importing countries like Nigeria still remain higher relative to its major trading partners. This is as a result of high trade procedures required for cross border trade.Such scenario is related to the estimated result of model 1 in Table 4.11a whichsuggests that significant reduction in aggregate imports could be as a result of one-day increase in the average number of days required to complete import procedures. Previous studies have established significant negative impact of import procedures on bilateral imports (Bourdet & Persson, 2011 and 2012). Finally, it is important to understand that more complicated trade procedures in terms of additional documents required and high number of days to import all serve as restrictive measures to make imported goods less competitive in the home markets.Still, significant positive coefficient of number of days to export for model 1 in Table 4.11b showsan expansion in the volume of imports which could be due to high level of informal trading activities in the trading partners' countries. This result is contrary to the findings of studies mentioned above.

Similarly, it is important to analyse the differential impact ratio of ITCs and DTCs on Nigeria's aggregate imports. From the estimates of the two models, the ITCs component in the full period accounted for 38.0 percent and 43.0 percent though 60.0

percent and 50.0 percent, respectively in the pair-wise period.The DTCs component in the full period accounted for 62.0 percent and 57.0 percent while in the pair-wise period constituted 40.0percent and 50.0 percent, respectively. By implication, the impact ratio of DTCs component is higher, constituting 52.3 percent while the ITCs component constitutes 47.7 percent on average.

Table 4.11b: Impact of ITCs and DTCs on Nigeria's Aggregate Imports before TFA Period

	Model 1 (sub-period i.e. if year <=2013)			Model 2 (sub-period if year <=2013)		
Dependent variable Aggregate Imports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Aggregate GDP Nigeria (log)	8.523 (3.47)***	8.992 (4.11)***	8.578 (4.06)***	21.634 (2.23)**	27.108 (3.45)***	25.969 (3.38)***
Aggregate GDP Partners (log)	0.496 (9.47)***	0.379 (0.44)	0.524 (4.68)***	0.477 (8.85)***	-0.166 (-0.20)	0.496 (4.38)***
Tariff	-0.201 (-0.79)	-0.220 (-0.99)	-0.203 (-0.93)	-0.921 (-1.81)*	-1.173 (-2.81)***	-1.126 (-2.75)**
Cost to import a container Nigeria (log)	0.0003 (0.67)	0.0002 (0.67)	0.0003 (0.74)	0.0002 (0.37)	0.001 (2.00)**	0.001 (1.99)**
Cost to export a container Partners (log)	0.0003 (1.61)	0.0004 (1.03)	0.0003 (1.07)	0.0004 (1.80)*	0.0003 (0.81)	0.0003 (0.94)
Maritime transport (Nigeria)	-0.225 (-2.81)***	-0.223 (-3.17)***	-0.223 (-3.24)***	-0.107 (-1.13)	-0.116 (-1.41)	-0.116 (-1.44)
Maritime transport (Partners)	0.015 (5.19)***	0.001 (0.10)	0.013 (2.25)**	0.015 (5.19)***	0.005 (0.35)	0.012 (2.14)**
Institutional quality (Nigeria)	4.182 (1.71)*	4.091 (1.91)*	4.162 (1.99)**	3.900 (1.51)	4.699 (2.18)**	4.645 (2.19)**
Institutional quality (Partners)	-0.012 (-0.10)	-0.567 (-0.74)	0.051 (0.24)	-0.206 (-1.35)	-0.411 (-0.54)	-0.269 (-1.07)
Real effective exchange rate (Nigeria)	-0.031 (-1.73)*	-0.029 (-1.88)*	-0.031 (-2.02)**	-0.018 (-0.99)	-0.022 (-1.41)	-0.023 (-1.54)
Real effective exchange rate (Partners)	0.011 (1.45)	0.017 (1.85)*	0.013 (1.64)	0.009 (1.18)	0.019 (2.02)**	0.014 (1.66)*
Ratio of road transport to population (Nigeria)				0.329 (1.61)	0.424 (2.54)**	0.411 (2.50)**
Ratio of road transport to population (Partners)	-0.00002 (-0.37)	-0.0001 (-0.16)	-0.0001 (-0.37)	-0.00001 (-0.12)	-0.0001 (-0.44)	-0.0001 (-0.39)
Days to import (Nigeria)	0.033 (0.78)	0.033 (0.88)	0.032 (0.87)	-	-	-
Days to export (Partners)	0.036 (2.28)**	0.055 (2.34)**	0.047 (2.41)**	-	-	-
Documents to export (Partners)	-	-	-	0.010 (0.15)	-0.067 (-0.53)	-0.036 (-0.38)
Constant	-216.891 (-3.52)***	-225.844 (-4.02)***	-219.32 (-4.14)***	-600.431 (-2.17)**	-736.516 (-3.26)***	-723.326 (-3.28)***
Over identification test (p-value)	0.003 (0.9539)			0.347 (0.5556)		
F-test		4.85 (0.0000)			4.93 (0.0000)	
Hausman test		2.01 (0.9998)			2.31 (0.9988)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	180	180	180	180	180	180
R-square	0.664	0.243	0.816	0.658	0.085	0.811

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1. The measure of aggregate imports includes the summation of agriculture, manufacturing and extractive sectors' exports. While the summation of industry and agriculture, value added (constant 2010 US$) gives rise to Aggregate GDP across the trading partners.In the pair-wise period, variable "number of documents required to import" (models 1 and 2) while "Nigeria'sratio of total roads network to total population" (model 1) are omitted from the estimation because ofcollinearity.

Source: Author's computation.

4.3.2.2 Impact of DTCsand ITCs on Nigeria's Agricultural Imports from its major Trading Partners

The results of gravity model estimated to discern the impact of domestic and international trade costs on Nigeria's agricultural imports from its major trading partners are shown in Table 4.12a for the full period while in Table 4.12b for the pair-wise period. As usual, two models are presented for the full and pair-wise periods as shown in Tables 4.12a and 4.12b. Also, based on Hausman test statistics, RE model is interpreted for both models 1 and 2 under the two periods. The estimates in Table 4.12a reveal that all the significant explanatory variables in model 1 follows the expected signs except tariff, cost to import and export while tariff and cost to export do not have the expected signs in model 2. In the case of Table 4.12b, tariff and cost to export are inconsistent with the expected sign in model 1 but agricultural sector GDP of Nigeria, cost to export and Nigeria's REER in model 2 do not follow the expected signs.

The ITCscomponent for models 1 and 2 in Table 4.12a (tariff, maritime transport of Nigeria and the trading partners) have positive significant impact.But in model 1, REER of both Nigeria and the trading partners exert negative significant impact with only trading partners' REER in model 2 on agricultural imports. The common DTCs component in models 1 and 2 (both ratio of total roads network to total population and institutional quality of Nigeria and cost to export) all exert positive impact. In addition, cost to import in model 1 and institutional quality of trading partners in model 2 have positive impact except number of days to process import with negative and significant impact in model 1. In Table 4.12b, the estimates of model 1 show that apart from maritime transport of trading partners that has positive impact in the two models, tariff and Nigeria's maritime transport also have positive impact while Nigeria's REER has negative impact. Model 2 shows negative impact of tariff and Nigeria's maritime transport but positive impact of Nigeria's REER. For the DTCs component, both models show negative impact of cost to import and positive impact of cost to export. Also in model 1, institutional quality of Nigeria has positive while number of days to import has negative impact. Finally, both institutional quality and ratio of total roads network to total population of Nigeria have negative impact except institutional quality of trading partners with positive impact as shown in model 2.

Under the two models in Table 4.12a, the 'standard' gravity model variable that captures sectoral market size proxied by agricultural sector GDP of both Nigeria and the trading partnerswere found to havesignificant positive impact on Nigeria's agricultural goods imports with larger impact being exerted by Nigeria's agricultural sector GDP. On the other hand, estimates of the two models in Table 4.12b show that only the agricultural sector GDP of the trading partners had significant positive impact on Nigeria's agricultural imports. Agricultural sector GDP of Nigeria had no impact in model 1 but has significant negative impact on agricultural imports in model 2. This case buttresses the fact that Nigeria tends to import less of certain agricultural products which could be produced more relatively cheaper at home than being imported. Contrary to this scenario is the fact that, despite high (double digits) tariff rates imposed on imported agricultural products in Nigeria, volume of such commodities being imported is still highdue tolow production capacity to produce such products. The background analysis corresponds to the estimated results showing significant positive coefficient of trade tariff under the two models in Table 4.12a and model 1 in Table 4.12b.This denotes that tariff imposed on imported agricultural products from trading partners is high, leading to aggravation of high trade costs thus increases agricultural goods imported. This result is contrary to the findings of Hoekman and Nicita (2011) who found a negative impact of tariff on trade flows andthat tariff remains a significant measure of trade restriction for developing countries.However, its significant negative impact in model 2 of Table 4.12b implies that 1 percent increase in tariff rate in Nigeria tends to reduce its imported agricultural products by 2.17 percent.

The estimates of model 1 in Table 4.12a indicate the impact of REER as a deterrent to bilateral imports. Both Nigeria's and trading partners' REER were found to have significant negative impact on Nigeria's agricultural imports with Nigeria's REER having greater impact. This implies that depreciation of Naira reduces agricultural goods imports more than when similar action is undertaken by the trading partners. For model 1 in Table 4.12b, only Nigeria's REER has significant negative impact. Comparing the estimates of the two periods, the results also indicate that depreciation of Naira before the TFA (0.08 percent) reduces agricultural goods imports less compared to the period with TFA (0.21 percent). In model 2, however, significant positive coefficient in Table 4.12b denotes appreciation of Naira. The implication is

that the purchasing power of Nairaimproves, thereby reduces the trade costs and increases agricultural goods imported.

The estimated results of model 2 in Table 4.12a indicate significant positive impact of institutional quality of both Nigeria and the trading partners with larger impact being exerted by the institutional quality of Nigeria than that of the trading partners. This impliesthat better and improved institutional setup in Nigeria together with similar situation in the trading partners' countries enhances Nigeria's agricultural imports. On the other hand, model 2 in Table 4.12b shows that very weak institutional setup in Nigeria could reduce its agricultural imports more than marginal increase when having a well-structured institution in the trading partners' countries. More so, the estimates of model1 in Tables 4.12a and 4.12b clearly show that maintaining an improved institution in Nigeria increases its agricultural imports more with the TFA than before the TFA period.

In Table 4.12a, the estimates of the two models reveal significant positive coefficients of maritime transport both for Nigeria and the trading partners with maritime transport of Nigeria having greater impact. This suggests that upgrading the status of Nigeria's maritime transport coupled with improved condition of that of the trading partners could induce the imports of agricultural products in Nigeria. The same scenario holds in the case of model 1 in Table 4.12b. In the estimates of model 2, however, poor condition of Nigeria's maritime transport has greater impact of reducing its agricultural imports than the increase recorded with improved condition of maritime transport of the trading partners.

Table 4.12a: Impact of ITCs and DTCs on Agricultural Sector imports for the Period 2005-2016

	Model 1 (Full Period)			Model 2 (Full Period)		
Dependent variable Agricultural Imports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Agricultural Sector GDP Nigeria (log)	82.126 (4.82)***	79.393 (5.11)***	81.049 (5.31)***	47.961 (3.56)***	44.270 (3.35)***	45.187 (3.56)***
Agricultural Sector GDP Partners (log)	0.383 (7.06)***	0.165 (0.18)	0.324 (2.79)***	0.403 (7.06)***	0.826 (0.82)	0.336 (2.74)***
Tariff	2.328 (5.35)***	2.319 (5.88)***	2.327 (5.98)***	1.004 (4.24)***	0.969 (4.18)***	0.964 (4.35)***
Cost to import a container (Nigeria)	0.007 (4.37)***	0.007 (4.32)***	0.007 (4.68)***	-0.0004 (-0.88)	-0.001 (-1.22)	-0.001 (-1.35)
Cost to export a container (Partners)	0.001 (3.27)***	0.002 (2.58)**	0.002 (2.79)***	0.002 (4.11)***	0.003 (2.45)**	0.002 (3.15)***
Maritime transport (Nigeria)	0.350 (5.37)***	0.349 (5.93)***	0.349 (6.00)***	0.174 (3.63)***	0.169 (3.74)***	0.169 (3.78)***
Maritime transport (Partners)	0.012 (3.53)***	-0.004 (-0.22)	0.015 (2.38)**	0.012 (3.53)***	-0.017 (-0.96)	0.015 (2.28)**
Institutional quality (Nigeria)	32.952 (4.29)***	32.793 (4.70)***	32.892 (4.79)***	11.223 (2.62)***	10.189 (2.43)**	10.530 (2.62)***
Institutional quality (Partners)	0.476 (2.61)***	-0.843 (-1.08)	0.400 (1.32)	0.938 (4.75)***	-1.182 (-1.39)	0.639 (1.92)*
Real effective exchange rate (Nigeria)	-0.207 (-4.27)***	-0.201 (-4.56)***	-0.205 (-4.74)***	-0.019 (-0.80)	-0.007 (-0.30)	-0.013 (-0.60)
Real effective exchange rate (Partners)	-0.013 (-1.45)	-0.012 (-1.02)	-0.018 (-1.74)*	-0.010 (-1.09)	-0.010 (-0.78)	-0.019 (-1.68)*
Ratio of road transport to population (Nigeria)	1.532 (4.71)***	1.476 (4.96)***	1.516 (5.20)***	0.719 (3.23)***	0.642 (2.89)***	0.671 (3.20)***
Ratio of road transport to population (Partners)	-0.0003 (-3.35)***	0.001 (1.02)	-0.0002 (-0.88)	-0.0003 (-3.54)***	0.001 (1.03)	-0.0002 (-0.99)
Days to import (Nigeria)	-0.383 (-4.15)***	-0.402 (-4.76)***	-0.395 (-4.76)***	-	-	-
Days to export (Partners)	-0.058 (-2.36)**	-0.010 (-0.27)	-0.032 (-1.14)	-	-	-
Documents to import (Nigeria)	-	-	-	-0.057 (-1.05)	-0.048 (-0.79)	-0.031 (-0.56)
Documents to export (Partners)	-	-	-	0.080 (1.02)	0.035 (0.32)	0.016 (0.17)
Constant	-2217.94 (-4.83)***	-2136.739 (-5.11)***	-2187.397 (-5.31)***	-1292.56 (-3.55)***	-1199.692 (-3.31)***	-1215.437 (-3.54)***
Over identification test (p-value)	0.717 (0.6987)			0.593 (0.4414)		
F-test		4.96 (0.0000)			4.67 (0.0000)	
Hausman test		8.91 (0.7102)			13.12 (0.3607)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	220	220	220	220	220	220
R-square	0.409	0.016	0.634	0.338	0.026	0.578

Note: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1.

Source: Author's computation.

As indicated in Table 4.12a, the estimates of both models reveal that a point increase in the ratio of the quality of available roads network to total population of Nigeria tend to reduce the burden on the available roads network. As a result, high transportation and delivery costs associated with moving imported goods from Nigerian seaport through road to the final users could be reduced, thereby leading to increased Nigeria's agricultural imports. On the contrary, low stock of road infrastructure networkis connected to low ratio of roads network to population of Nigeria, which is a reflection of its negative coefficient (-2.619) shown by the estimate of model 2 in Table 4.12b. The result suggests that low ratio of total roads network to total population in Nigeria increases cost of trading through higher unit cost of transportation by the available road network in the country, thus reduce the volume of agricultural goods imported to Nigeria.

In the case of DBI, time delay and high costare mainly caused by high trade procedures either in the exporting or importing countries (World Bank Group, 2016). Nigeria as an importing country still requires about 7.2 days and US$564 to complete import procedures despite the TFA (See Table 2.3). Time delay and high cost constitute inefficient trade procedures, thus hinder bilateral trade flows between or among trading partners. These procedures are also a reflection of more complex trade procedures in the country with significant negative coefficient of time delay in Nigeria as shown in model 1 of Tables 4.12a and 4.12b.By implication, increasing number of days required to comply with all necessary procedures in Nigeria's border reduces bilateral imports of agricultural products. This connotes that importing agricultural products in Nigeria could be difficult if government fails to reform its trade procedures through reducing time delays at the border.Comparatively, the estimates shows that extra-one day mandated to complete importing procedures before the TFA period hindered agricultural imports (1.18 percent) more than with the TFA period (0.39 percent).In addition, propensity to import agricultural products in Nigeria is inhibited by high cost to import a container.This is shown by the significant negative coefficient of cost to import in models 1 and 2 of Table 4.12b. The estimates further suggest that increase in the cost of moving a container by US$1 could lead to marginal reduction in the volume of agricultural products imported in Nigeria by 0.01 percent and 0.02 percent, respectively.

Estimates of model 1 in Table 4.12a indicate that the cost to import is positive and statistically significant. This is not expected because high cost to import is trade restrictive in the importing country.It imposes more barriers on importation so as to discourage imports of agricultural products. The incident of informal trading activities could be responsible for increased volume of agricultural goods imports despite higher cost of moving a 20-foot container. Also, cost to export under the two models in Tables 4.12a and 4.12b is inconsistent with the theory. This could also be explained by non-durability nature of agricultural commodities being traded because of inability to add value in the production chain, making it difficult to qualify as intermediate products. In such case, the priority of the trading partners in the exporting countriescould be about quick delivery of perishable nature of the commodities within the short period irrespective of high cost associated.

The differential impactratio of ITCs and DTCs components for the two models under the full period estimations are equal. However, ITCs component in the pair-wise period constitutes 50.0 percent and 44.0 percent while the DTCs accounted for 50.0 percent and 56.0 percent, respectively. On average, the impact ratio of DTCs component (52.0 percent) on agricultural imports is higher than the ITCs component (48.0 percent).

Table 4.12b: Impact of ITCs and DTCs on AgriculturalSector imports for the Period before TFA

	Model 1 (sub-period i.e. if year <=2013)			Model 2 (sub-period i.e. if year <=2013)		
Dependent variable Agricultural Imports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Agricultural Sector GDP Nigeria (log)	-10.216 (-0.22)	-5.315 (-1.45)	-5.830 (-1.59)	-57.745 (-0.26)	-105.826 (-5.68)***	-106.523 (-5.76)***
Agricultural Sector GDP Partners (log)	0.347 (6.79)***	0.731 (0.94)	0.355 (3.03)***	0.376 (7.09)***	0.733 (0.94)	0.348 (2.78)***
Tariff	1.546 (1.18)	1.405 (7.60)***	1.418 (7.70)***	-1.129 (-0.23)	-2.143 (-5.13)***	-2.168 (-5.22)***
Cost to import a container Nigeria (log)	-0.011 (-0.79)	-0.010 (-5.74)***	-0.010 (-5.87)***	-0.011 (-0.32)	-0.018 (-6.14)***	-0.018 (-6.22)***
Cost to export a container Partners (log)	0.001 (3.24)***	0.001 (2.20)**	0.001 (2.68)***	0.001 (2.70)***	0.001 (2.37)**	0.001 (2.76)***
Maritime transport (Nigeria)	0.522 (0.38)	0.377 (3.07)***	0.389 (3.18)***	-0.656 (-0.51)	-0.929 (-6.44)***	-0.934 (-6.51)***
Maritime transport (Partners)	0.011 (3.66)***	-0.001 (-0.09)	0.011 (1.73)*	0.011 (3.36)***	-0.002 (-0.11)	0.012 (1.80)*
Institutional quality (Nigeria)	8.014 (0.66)	9.475 (3.78)***	9.178 (3.67)***	-9.839 (-0.17)	-21.933 (-4.15)***	-22.305 (-4.26)***
Institutional quality (Partners)	0.188 (0.82)	1.126 (1.18)	0.439 (1.33)	0.819 (3.68)***	1.015 (1.10)	0.696 (1.85)*
Real effective exchange rate (Nigeria)	-0.074 (-1.78)*	-0.077 (-4.08)***	-0.077 (-4.11)***	0.046 (0.14)	0.116 (3.63)***	0.117 (3.67)***
Real effective exchange rate (Partners)	0.001 (0.09)	0.006 (0.52)	0.005 (0.53)	0.006 (0.59)	0.006 (0.55)	0.005 (0.48)
Ratio of road transport to population (Nigeria)	-	-	-	-1.569 (-0.32)	-2.604 (-6.39)***	-2.619 (-6.48)***
Ratio of road transport to population (Partners)	-0.0003 (-3.60)***	0.001 (1.60)	-0.0002 (-1.09)	-0.0004 (-4.12)***	0.001 (1.62)	-0.0002 (-0.85)
Days to import (Nigeria)	-1.353 (-0.80)	-1.157 (-6.41)***	-1.182 (-6.57)***	-	-	-
Days to export (Partners)	-0.081 (-2.83)***	-0.021 (-0.44)	-0.039 (-1.16)	-	-	-
Documents to export (Partners)	-	-	-	0.062 (0.73)	-0.016 (-0.08)	0.041 (0.29)
Constant	322.088 (0.27)	183.307 (1.90)*	206.676 (2.17)**	1670.018 (0.27)	3003.056 (5.76)***	3031.709 (5.86)***
Over identification test (p-value)	0.137 (0.7110)			0.055 (0.8153)		
F-test		7.51 (0.0000)			8.47 (0.0000)	
Hausman test		8.23 (0.8282)			6.64 (0.8278)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	160	160	160	160	160	160
R-square	0.591	0.203	0.619	0.553	0.194	0.570

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1.
In the pair-wise period, variable "number of documents required to import" (models 1 and 2) whileNigeria'sratio of total roads network to total population" (model 1) are omitted from the estimation because ofcollinearity.
Source: Author's computation.

4.3.2.3 Impact of DTCs and ITCs on Nigeria's Manufacturing SectorImports from its major Trading Partners

The results of the impact of domestic and international trade costs on manufacturing sector imports both for full and pair-wise periods are presented in Tables 4.13a and 4.13b. RE model is preferred based on Hausman test statistics in each of the estimated models in Tables 4.13a and 4.13b. The estimates of models 1 and 2 in Table 4.13a reveal that the component of ITCs that are statistically significant are all conform to the expected sign except Nigeria's REER in model 1. Likewise, all the component of DTCs in the two models are consistent with the expected signs but number of days to import in model 1. On the other hand, the component of ITCs and DTCs which are statistically significant in the pair-wise period estimations are all consistent with the expected signs except tariff in model 1 (See Tables 4.13b).

The RE estimates of model 2 in Table 4.13a reveal significant positive impact of both Nigeria's and the trading partners' manufacturing sector GDP on Nigeria's manufacturing imports with that of Nigeria having greater impact. Although in model 1, only manufacturing sector GDP of the trading partners had significant positive impact. In Table 4.13b,however, the estimates of the two models show that only the manufacturing sector GDP of trading partners had significant positive impact on Nigeria's manufacturing imports. More so, Nigeria's manufacturing sector GDP had no impact in model 1 but significant negative impact on manufacturing imports in model 2. This also implies that Nigeria imports less of certain manufactured products which its factors are relatively abundant and relatively cheap domestically.

As shown bythe estimates of the two models in Table 4.13a and model 2 in Table 4.13b, tariff is significantly negative implying that Nigeria imposes high tariff rate as preventive measure on manufactured products coming from its trading partners. This eventually reduces importation of manufactured products into the country and also to make imported manufactured goods less competitive in the domestic markets due to higher trade costs associated.Conversely, positive coefficient of tariff in model 1 is not theoretically supported. This could be due to low production capacity and competency (i.e., low technological skills) in producing certain manufacturing products in Nigeria, especially capital goods. This makes importation of such products increase as government imposes high tariff rate on them.

Significant positive coefficient of Nigeria's REER signifiesappreciation of local currency (Naira) against that of the trading partners,which by implication encourages imports of manufacturing products in Nigeria. The analysis further demonstrates that imported manufacturing products in Nigeria become competitive as prices are relatively cheaper and affordable.

Under the two models in Table 4.13a and model 2 in Table 4.13b, Nigeria's maritime transport is negative andstatistically significant. This also indicates that poor condition of Nigeria's maritime transport associated with inadequate trade-related infrastructure in place could prevent Nigeria from facilitating trade, contributes to low access to global trade and ineffective participate in international trade. This constitutes higher trade costs and thus reduces the volume of manufactured goods imported in Nigeria. For model 2 in Table 4.13a, the estimates suggest that additional improvement in the ratio of roads network to population in Nigeria could bring about an increase in its imports. However, the estimates of model 1 in Table 4.13a and model 2 in 4.13b indicate that an extremely low ratio of total roads network to total population in Nigeriacould induce the transportation and delivery costs and thus lead to a reduction in the manufactured goods importedfrom its trading partners.

As clearly observedin the background analysis that the negative figure revealed by the indicators of institutional quality for Nigeria among its major trading partners is a reflection of its very weak institutional structure. This therefore has tendency of increasing trade costs associated with corruption tax and thus impede its imports of manufactured products. This is confirmed by the estimated results of the two models in Tables 4.13a and model 1 in Table 4.13b.

Table 4.13a: Impact of ITCs and DTCs on Manufacturing Sector Imports for the Period 2005-2016

	Model 1 (Full Period)			Model 2 (Full Period)		
Dependent variable Manufacturing Imports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Manufacturing Sector GDP Nigeria (log)	-4.275 (-1.19)	-2.801 (-1.15)	-3.105 (-1.26)	10.124 (2.27)**	5.544 (1.69)*	6.498 (2.16)**
Manufacturing Sector GDP Partners (log)	0.574 (9.59)***	0.536 (0.75)	0.585 (4.26)***	0.540 (9.39)***	0.142 (0.20)	0.553 (4.11)***
Tariff	-0.901 (-2.12)**	-0.609 (-2.07)**	-0.687 (-2.40)**	-0.852 (-2.34)**	-0.496 (-1.92)*	-0.569 (-2.31)**
Cost to import a container (Nigeria)	-0.005 (-2.00)**	-0.003 (-1.76)*	-0.003 (-2.17)**	0.00003 (0.09)	-0.0001 (-0.44)	-0.0001 (-0.19)
Cost to export a container (Partners)	-0.0004 (-1.27)	-0.0003 (-0.84)	-0.0003 (-1.14)	0.00002 (0.08)	0.0003 (0.78)	0.0002 (0.59)
Maritime transport (Nigeria)	-0.273 (-1.86)*	-0.171 (-1.65)*	-0.198 (-2.00)**	-0.379 (-2.25)**	-0.203 (-1.65)*	-0.238 (-2.10)**
Maritime transport (Partners)	0.009 (2.51)**	-0.002 (-0.17)	0.010 (1.00)	0.011 (3.17)***	-0.004 (-0.35)	0.008 (1.15)
Institutional quality (Nigeria)	-9.742 (-2.44)**	-8.012 (-2.96)***	-8.563 (-3.09)***	-11.282 (-2.42)**	-8.010 (-2.48)**	-8.725 (-2.72)***
Institutional quality (Partners)	-0.092 (-0.63)	0.530 (0.92)	-0.011 (-0.04)	-0.299 (-2.08)**	0.489 (0.89)	-0.109 (-0.44)
Real effective exchange rate (Nigeria)	0.184 (1.85)*	0.110 (1.55)	0.128 (1.95)*	0.032 (0.93)	0.014 (0.55)	0.016 (0.68)
Real effective exchange rate (Partners)	0.008 (0.88)	0.002 (0.18)	0.002 (0.31)	0.009 (1.14)	0.004 (0.49)	0.004 (0.49)
Ratio of road transport to population (Nigeria)	-0.302 (-1.77)*	-0.201 (-1.70)*	-0.222 (-1.94)*	0.435 (2.56)**	0.230 (1.86)*	0.278 (2.45)**
Ratio of road transport to population (Partners)	-0.00002 (-0.30)	0.0002 (0.55)	-0.00004 (-0.22)	-0.00001 (-0.14)	0.0002 (0.64)	-0.00004 (-0.23)
Days to import (Nigeria)	0.234 (2.13)**	0.154 (1.95)*	0.175 (2.38)**	-	-	-
Days to export (Partners)	0.006 (0.27)	-0.007 (-0.28)	-0.002 (-0.09)	-	-	-
Documents to import (Nigeria)	-	-	-	-0.257 (-2.04)**	-0.119 (-1.35)	-0.149 (-1.78)*
Documents to export (Partners)	-	-	-	-0.136 (-2.06)**	-0.135 (-1.99)**	-0.120 (-1.94)*
Constant	118.425 (1.23)	77.565 (1.06)	84.848 (1.28)	-295.468 (-2.41)**	-152.618 (-1.87)*	-191.259 (-2.33)**
Over identification test (p-value)	4.729 (0.1927)			2.119 (0.3466)		
F-test		9.12 (0.0000)			9.97 (0.0000)	
Hausman test		1.96 (0.9998)			2.87 (0.9984)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	200	200	200	200	200	200
R-square	0.561	0.404	0.777	0.594	0.063	0.775

Note: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1.

Source: Author's computation.

In relation to number of documents required to import and export variables, estimates of model 2 in Table 4.13a reveal significant negative impact for both. This suggests that additional documents required to import in Nigeria has greater impact of reducing manufactured goods imports than additional documents required to export by the trading partners. In effect, one additional document required to imports in Nigeria reduces its manufactured goods imported by 0.15 percent, whereas the impact of one more document required to export by the trading partners reduces manufactured imports by 0.12 percent.Also, the estimated result obtained from model 1 in Table 4.13b indicates that border delay constituted by inefficient procedures leading to more number of days required to complete imports processes in Nigeria could reduce its manufactured goods imports by 0.18 percent.

Correspondingly, higher cost of importing a 20-foot container in Nigeria lowers import propensity as the burden of the costs incurred during the delivery process are shifted onto the consumers in the country and so inflate the prices of imported manufacturing products in Nigeria. This is supported by the estimates of the two models in Table 4.13b with US$10 increase in the cost to import leading toa reduction in manufacturing imports by 0.02 percent each. When comparing the coefficient of this variable under the two periods, the estimates show insignificant difference in the impact before the TFA period (0.02 percent) and with the TFA (0.03 percent).

As shown in model 1 of Table 4.13a, significant positive coefficient of number of days to import is not supported theoretically. One-extra day required to import is expected to hinder imports. But if substitution effect for importing manufactured products is high such that consumers in Nigeria create more preferences for the imported manufacturing products, increasing the days required might not hinder the importation of manufactured products.

Comparatively, the differential impact ratio of DTCs component on manufacturing imports is larger, recording 57.0 percent and 67.0 percent under the full period estimations whereas 75.0 percent and 50.0 percent in the pair-wise period estimations. For the ITCs component, 43.0 percent and 33.0 percent were recorded under the full period although under the pair-wise period, recorded 25.0 percent and 50.0 percent, respectively. On average, the component of DTCs constitutes 62.0 percent while the component of ITCs constitutes 38.0 percent.

Table 4.13b: Impact of ITCs and DTCs on Manufacturing Sector Imports for the Period before TFA

	Model 1 (sub-period i.e. if year <=2013)			Model 2 (sub-period if year <=2013)		
Dependent variable Manufacturing Imports	Pooled 2SLS	Fixed Effects Model	Random Effects Model	Pooled 2SLS	Fixed Effects Model	Random Effects Model
Manufacturing Sector GDP Nigeria (log)	-24.624 (-1.10)	-2.302 (-0.80)	-4.201 (-1.37)	-51.409 (-1.30)	-11.677 (-1.72)*	-17.727 (-2.40)**
Manufacturing Sector GDP Partners (log)	0.582 (5.76)***	1.142 (1.77)*	0.587 (3.73)***	0.549 (5.80)***	1.358 (2.26)**	0.616 (4.13)***
Tariff	0.499 (1.21)	0.100 (1.60)	0.134 (2.03)**	-1.221 (-0.93)	-0.161 (-1.29)	-0.274 (-2.04)**
Cost to import a container Nigeria (log)	0.001 (0.13)	-0.002 (-1.70)*	-0.002 (-1.90)*	-0.005 (-1.45)	-0.001 (-1.46)	-0.002 (-2.17)**
Cost to export a container Partners (log)	-0.0001 (-0.36)	0.0002 (0.39)	0.0002 (0.46)	-0.0003 (-0.76)	0.0001 (0.17)	0.0001 (0.14)
Maritime transport (Nigeria)	0.825 (1.18)	0.117 (1.09)	0.179 (1.56)	-3.271 (-0.97)	-0.515 (-1.63)	-0.816 (-2.39)**
Maritime transport (Partners)	0.012 (1.96)**	-0.004 (-0.28)	0.010 (1.17)	0.012 (2.04)**	-0.009 (-0.62)	0.006 (0.81)
Institutional quality (Nigeria)	-29.968 (-1.17)	-4.399 (-1.21)	-6.637 (-1.72)*	35.933 (0.79)	3.002 (0.91)	5.646 (1.62)
Institutional quality (Partners)	0.167 (0.57)	1.641 (1.88)*	0.333 (1.02)	-0.315 (-1.10)	1.906 (2.33)**	0.229 (0.67)
Real effective exchange rate (Nigeria)	0.358 (1.23)	0.034 (0.54)	0.083 (1.29)	-0.097 (-0.29)	0.016 (0.56)	0.041 (1.38)
Real effective exchange rate (Partners)	0.009 (0.52)	-0.013 (-1.23)	-0.006 (-0.60)	-0.003 (-0.15)	-0.014 (-1.40)	-0.007 (-0.75)
Ratio of road transport to population (Nigeria)	-	-	-	-3.761 (-1.09)	-0.734 (-1.80)*	-1.110 (-2.52)**
Ratio of road transport to population (Partners)	-0.0001 (-0.50)	0.0002 (0.68)	-0.0001 (-0.32)	-0.0001 (-0.50)	0.0002 (0.53)	-0.0001 (-0.66)
Days to import (Nigeria)	-0.346 (-1.34)	-0.161 (-2.02)**	-0.176 (-2.10)**	-	-	-
Days to export (Partners)	0.034 (0.87)	0.009 (0.20)	0.032 (0.92)	-	-	-
Documents to export (Partners)	-	-	-	-0.156 (-1.31)	-0.154 (-0.84)	-0.004 (-0.03)
Constant	504.572 (1.10)	35.807 (0.56)	86.612 (1.40)	1832.419 (1.19)	365.435 (1.64)	583.609 (2.42)**
Over identification test (p-value)	0.001 (0.9722)			0.233 (0.6297)		
F-test		10.87 (0.0000)			11.32 (0.0000)	
Hausman test		4.29 (0.9776)			1.15 (0.9999)	
No. of cross sections	20	20	20	20	20	20
No. of Observations	160	160	160	160	160	160
R-square	0.125	0.469	0.735	0.272	0.442	0.726

Notes: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1. In the pair-wise period, variable "number of documents required to import" (models 1 and 2) while "Nigeria's ratio of total roads network to total population" (model 1) are omitted from the estimation because of collinearity.

Source: Author's computation.

4.3.2.4 Impact of DTCs and ITCs on Nigeria's Extractive Sector Imports from its major Trading Partners

Similar to extractive export models, the results of the impact of domestic and international trade costs on extractive sector imports for full and pair-wise periods using PPML and fixed effects PPML estimators is reported in Tables 4.14a and 4.14b. To control for unobserved heterogeneity between country pairs and to account for exporter specific fixed effects, fixed effect PPML is also interpreted in each of the models. Models 1 and 2in Tables 4.14a and 4.14b indicate that all the explanatory variables are statistically significant at 1 percent confidence level. The model 1 estimates for full period show that extractive sector GDP of trading partners, the ITCs component (tariff)and the DTCs component (time to export and cost to import a container) are inconsistent with the expected signs.In the pair-wise period estimations, extractive sector GDP of trading partners, the ITCs component (tariff and trading partners' REER) and the DTCs component (cost to import a container) do not comply with the expected signs. For model 2, the ITCs component (tariff and Nigeria's REER) and the DTCs component (cost to import a container) do not conform with the theory in the full period estimation. In the pair-wise period estimation, only trading partners' REER is the ITCs component while the DTCs component (cost to import a container and required number of documents to export) are inconsistent with their expected signs.

Like the case of exports models where the extractive sector GDP of Nigeria is significantly positive while that of the trading partners is negative. In the imports models, the fixed effect PPML estimates of the two models (1 and 2) under each period reveal significant positive impact of extractive sector's GDP of Nigeria but negative and significant impact of the trading partners GDP on extractive sector's imports in Nigeria. The implication is that Nigeria is handicapped in refining some of these extractive products, particularly refined petroleum products and thereby making its importation more essential.Significant negative impact of tariff is considered as trade restrictive measures on imports of Nigeria's extractive sector as shown in model 2 of Table 4.14b. This is to show that trade costs could be aggravated due to high tariff and thus reduce import of extractive products. However, imposing high tariff on inelastic nature of products such as refined petroleum products might not be a

resistance to its importation in Nigeria. This is confirmed by the positive coefficients of tariff both in the full period (models 1 and 2) and pair-wise period (model 1).

REER of Nigeria and the trading partners are significantly negative as revealed by the estimates of model 1 in Table 4.14a.This demonstrates that depreciation of local currency (Naira)without counter measure from the trading partners bring about a reductionin extractive products imports by 0.13 percent and by 0.02 percent if such counter measure is taken by other trading partners.Comparing the estimates of model 1 for Nigeria's REER under the two periods, it is clearly shown that magnitude for the full period (0.13 percent) is higher than pair-wise period (0.09 percent).This suggests that depreciation of Naira before the TFA reduces extractive productsimports less compare to the period with TFA. In model 2, significant positive coefficient of Nigeria's REER in the full period connotes appreciation of Naira while trading partners' REER in the pair-wise period signifies appreciation of hard currency. Accordingly, the former reduces the transaction costs and increases imports of extractive products while the latter raises the transaction costs and reduce the imports of extractive products into the country.

Models 1 and 2 of full period estimates reveal significant positive coefficients of quality of institutions of both Nigeria and the trading partners. This indicates that well improved and well developed institutions both in the importing and exporting countries could significantly boost imports of extractive products. From the estimated results, Nigeria's institutional quality exerts greater impact than that of the trading partners on bilateral imports of extractive sector.On the other hand, the estimates of the two models in the pair-wise period show significant positive coefficient of institutional quality for Nigeria butsignificant negative for the trading partners. This implies that existence of very weak institutional arrangement in the trading partners' countries with no similar case in Nigeria might not reduce extractive products imports.

Table 4.14a: Impact of ITCs and DTCs on Extractive Sector Imports for thePeriod 2005-2016

	Model 1 (Full Period)		Model 2 (Full Period)	
Dependent variable Extractive Imports	Pooled PPML	Fixed Effect PPML	Pooled PPML	Fixed Effect PPML
Extractive Sector GDP Nigeria (log)	21.378 (740.02)***	22.391 (731.19)***	10.387 (332.81)***	18.572 (477.74)***
Extractive Sector GDP Partners (log)	-0.079 (-167.15)***	-1.881 (-309.21)***	-0.047 (-99.72)***	-2.570 (-407.65)***
Tariff	0.762 (340.24)***	0.427 (180.97)***	0.601 (298.25)***	0.129 (61.18)***
Cost to import a container (Nigeria)	0.006 (754.96)***	0.005 (703.84)***	0.0003 (71.82)***	0.002 (440.54)***
Cost to export a container (Partners)	0.001 (449.59)***	-0.001 (-168.33)***	0.0004 (160.47)***	-0.003 (-568.98)***
Maritime transport (Nigeria)	-0.090 (-138.86)***	-0.144 (-211.14)***	-0.011 (-14.98)***	-0.174 (-203.03)***
Maritime transport (Partners)	0.015 (547.25)***	-0.083 (-474.57)***	0.014 (512.57)***	-0.077 (-446.61)***
Institutional quality (Nigeria)	26.886 (584.71)***	24.308 (516.35)***	11.704 (282.04)***	11.026 (250.30)***
Institutional quality (Partners)	0.564 (482.52)***	0.796 (77.08)***	0.594 (513.39)***	0.524 (48.04)***
Real effective exchange rate (Nigeria)	-0.135 (-463.21)***	-0.126 (-409.76)***	-0.004 (-11.17)***	0.001 (2.24)**
Real effective exchange rate (Partners)	-0.021 (-303.33)***	-0.021 (-142.73)***	-0.020 (-301.47)***	-0.001 (-4.92)***
Ratio of road transport to population (Nigeria)	-0.315 (-81.60)***	-0.988 (-247.46)***	-1.708 (-568.70)***	-1.907 (-589.66)***
Ratio of road transport to population (Partners)	0.001 (136.57)***	-0.013 (-109.65)***	0.001 (115.76)***	-0.016 (-137.44)***
Days to import (Nigeria)	-0.331 (-740.20)***	-0.293 (-594.78)***	-	-
Days to export (Partners)	-0.046 (-192.08)***	0.067 (212.55)***	-	-
Documents to import (Nigeria)	-	-	-0.022 (-44.68)***	-0.058 (-94.84)***
Documents to export (Partners)	-	-	-0.030 (-49.95)***	-0.099 (-97.74)***
Constant	-472.780 (-704.95)***		-218.864 (-285.91)***	
No. of cross sections	20	20	20	20
No. of Observations	240	240	240	240
Log likelihood	-3314763.2	-941336.45	-3797145.7	-1167472.7
Pseudo R-square	0.382	-	0.292	-

Note: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1. Extractive sector is made up of mineral fuels, lubricants and related, metal ores, quarrying and other mining products. Export of mineral fuels, lubricants and related was used for the analysis but mineral or oil GDP could not be found as most of the trading partners are not oil producing countries. Rather, the researcher subtracted the manufacturing value added from the industry value added (constant 2010US$) to arrive at extractive value added.

Source: Author's computation.

For models 1 and 2 in Table 4.14a and 4.14b, maritime transport of Nigeria and the trading partners are both negative and statistically significant. The estimated results predict higher impact of reducing imports of extractive products due to low andunimproved status of Nigeria's maritime transport than that of the trading partners under the two periods.Correspondingly, significant negative coefficient of the ratio of total roads network to total population of both Nigeria and the trading partners reported for the two periods suggest that low ratio of roads stock to population of Nigeria and the trading partners significantly increases transport costs and other costs related to product delivery, thus reduces the imports of extractive products. Comparatively, the estimates also reveal that the ratio of total roads network to total population of Nigeria has greater impact than that of the trading partners on bilateral imports of extractive sector.

Looking at the DBI, the estimated resultsin model 2 reveal that required number of documents to export in the pair-wise period is positive and statistically significant. Time to export in model 1of full period also exerts significant positive impact on imports of extractive products. This connotes that the requirements for cross-border trade constituted by bureaucratic processes and waiting time for clearing goods at the border are increasing.Thus, bilateral trade flows among trading partners is expected to be hindered.However, a possible explanation could be that products coming from larger exporters whose exports are more competitive are required to pass through rigorous border checks so that their level of international competitiveness can be maintained.

In the estimates of model 1 for pair-wise period, time to import and export are both negative and statistically significant. The result further shows that increasing time to import has greater impact on imports of extractive products than increasing time to export. While the estimate for the full period shows that a one-day increase in the number of days required to process import significantly reduces imports of extractive products by 0.29 percent. This connotes that more time to import is like imposing more barriers on importing extractive products in order to encourage local production of refined petroleum products. The estimates of the required number of documents to import and export in model 2 of full period are both negative and statistically significant. This also indicates that the impact of additional documents on extractive sector imports is greater for documents required to export (a reduction in extractive

products imports by 0.10 percent) than for documents required to import (a reduction in extractive products imports by 0.06 percent).

Under the two periods, the estimated results in the two models show significant negative impact of cost to export a container. The estimates further indicate that a US$1 increase in the cost to export lead to a reduction in extractive products imported. However, a contrary case is reported for cost to import a container as the coefficients indicated a positive impact on extractive sector imports. The implication of this estimate is that increasing the cost to import might not reduce importation as substitution effect of importing extractive products is greater than refining domestically. Also, the capacity of Nigeria to refine such extractive products locally so as to meet the domestic demand might be very low and therefore require its importation irrespective of higher costs associated.

This is similar to the case of extractive sector exports such that the differential impact ratio of ITCs and DTCs components in each of the two models under the full period are the same. However, in the pair-wise period, the ITCs accounted for 38.0 percent and 42.0 percent while the DTCs recorded 62.0 percent and 58.0 percent, respectively. Generally, the differential impact ratio of DTCs component (61.0 percent) is higher compare to that of the ITCs component (39.0 percent) on extractive sector imports.

Table 4.14b: Impact of ITCs and DTCs on Extractive Sector Imports for thePeriod before TFA

	Model 1 (sub-period i.e. if year <=2013)		Model 2 (sub-period i.e. if year <=2013)	
Dependent variable Extractive Imports	Pooled PPML	Fixed Effect PPML	Pooled PPML	Fixed Effect PPML
Extractive Sector GDP Nigeria (log)	29.917 (570.46)***	31.434 (583.95)***	37.687 (536.31)***	28.545 (443.96)***
Extractive Sector GDP Partners (log)	0.057 (75.77)***	-1.708 (-222.07)***	0.149 (193.66)***	-1.946 (-250.63)***
Tariff	0.894 (172.53)***	0.664 (127.46)***	0.271 (77.72)***	-0.354 (-124.35)***
Cost to import a container Nigeria (log)	0.005 (517.66)***	0.005 (487.47)***	0.011 (346.46)***	0.003 (431.58)***
Cost to export a container Partners (log)	0.001 (351.95)***	-0.003 (-250.57)***	0.001 (408.11)***	-0.003 (-260.16)***
Maritime transport (Nigeria)	-0.435 (-110.92)***	-0.525 (-133.67)***	-0.792 (-266.50)***	-1.254 (-457.45)***
Maritime transport (Partners)	0.018 (414.86)***	-0.099 (-416.18)***	0.017 (410.06)***	-0.104 (-448.20)***
Institutional quality (Nigeria)	28.755 (453.12)***	27.403 (430.38)***	30.497 (465.09)***	26.768 (417.95)***
Institutional quality (Partners)	-0.356 (-138.80)***	-1.406 (-78.25)***	0.452 (207.62)***	-1.161 (-65.47)***
Real effective exchange rate (Nigeria)	-0.101 (-175.10)***	-0.085 (-146.60)***	-0.096 (-168.29)***	-0.030 (-46.01)***
Real effective exchange rate (Partners)	-0.036 (-290.38)***	0.026 (108.66)***	-0.035 (-275.85)***	0.029 (125.61)***
Ratio of road transport to population (Nigeria)	0.080 (3.63)***	-1.189 (-53.46)***	-1.352 (-77.05)***	-6.057 (-704.83)***
Ratio of road transport to population (Partners)	0.003 (283.30)***	-0.027 (-128.51)***	0.002 (241.23)***	-0.018 (-111.73)***
Days to import (Nigeria)	-0.556 (-255.12)***	-0.503 (-229.69)***	-	-
Days to export (Partners)	-0.137 (-389.19)***	-0.010 (-15.27)***	-	-
Documents to import (Nigeria)	-	-	-1.518 (-248.05)***	-
Documents to export (Partners)	-	-	-0.026 (-30.68)***	0.302 (186.74)***
Constant	-677.544 (-487.23)***		-854.226 (-460.16)***	
No. of cross sections	20	20	20	20
No. of Observations	180	180	180	180
Log likelihood	-1308390.4	-452716.83	-1394765.7	-463467.43
Pseudo R-square	0.509	-	0.477	-

Note: z-test are in parentheses while ***, **, and *, respectively represent p<0.01, p<0.05, and p<0.1
Extractive sector is made up of mineral fuels, lubricants and related, metal ores, quarrying and other mining products. Export of mineral fuels, lubricants and related was used for the analysis but mineral or oil GDP could not be found as most of the trading partners are not oil producing countries. Rather, the researcher subtracted the manufacturing value added from the industry value added (constant 2010 US$) to arrive at extractive value added.

Source: Author's computation.

4.3.3 Nigeria and Trading Partners' Trade Flows: Observed Trade Costs Impact

The summary of results of the impact of trade costs on bilateral trade flows between Nigeria and its major trading partners is presented in Table 4.15. Empirical results confirmed that, both for aggregate and disaggregated analyses, trade costs substantially affect the trade flows between Nigeria and its major trading partners. Although, the significant impact ratio of DTCs components on aggregate, agriculture, manufacturing and extractive sectors is higher relative to the ITCs components. In the export models, Nigeria's aggregate export was promoted by own and trading partners' institutional quality, own and partners' ratio of road transport to population, trading partners' maritime transport while inhibited by own maritime transport. Time required to export, cost to export, Nigeria's real effective exchange rate and poor status of its maritime transport inhibited agricultural export, while improved condition of trading partners' maritime transport and a very strong institutions both in Nigeria and trading partners' promoted it. Also, Nigeria's manufacturing export is hindered by its time delay, high cost to export a container and poor state of infrastructures while improved state of infrastructure of the trading partners' stimulated it. Moreover, Nigeria's extractive export is hindered by own and trading partners' high number of documentsrequired, time, poor state of infrastructure and high tariff, but enhanced by own and trading partners' improved quality of institutions.

In the import models, Nigeria's aggregate import was stimulated by own quality of institutions and improved ratio of road transport to population but inhibited by high tariff, poor maritime status and more time to import. In addition, poor state of Nigeria's maritime transport, Nigeria's weak institutional quality, low stock of road infrastructure and time to import in Nigeria significantly hindered its agricultural and manufacturing imports. Finally, Nigeria's extractive import is inhibited by own and trading partners' poor state of maritime transport, own and trading partners' low stock of road infrastructure, own and trading partners' time and required number of documents to import. In terms of differential impact ratio, the DTCs components on aggregate, agricultural, manufacturing and extractive exports constituting (57.5%, 63.5%, 74.0% and 62.0%) was higher than the ITCs (42.5%, 36.5%, 26.0% and 38.0%), respectively. Also, the differential impact of DTCs components on aggregate in agricultural,

manufacturing and extractive imports, accounting for 52.3%, 52.0%, 62.0% and 61.0%, was higher than the ITCs component (47.7%, 48.0%, 38.0% and 39.0%), respectively.

Table 4.15: Summary of Results on the Impact of Trade Costs on Bilateral Trade Flows between Nigeria and its major Trading Partners

	Trade Costs Components	Impact of Trade Costs on Nigeria's Exports		Impact of Trade Costs on Nigeria's Imports		Differential Impact Ratio
		Full period (2005-2016)	Sub-period (2005-2014)	Full period (2005-2016)	Sub-period (2005-2014)	
Aggregate	DTCs	✓	✓	✓	✓	DTCs>ITCs
	ITCs	✓	✓	✓	✓	
Agriculture sector	DTCs	✓	✓	✓	✓	DTCs>ITCs
	ITCs	✓	✓	✓	✓	
Manufacturing sector	DTCs	✓	✓	✓	✓	DTCs>ITCs
	ITCs	✓	✓	✓	✓	
Extractive sector	DTCs	✓	✓	✓	✓	DTCs>ITCs
	ITCs	✓	✓	✓	✓	

Note:"✓" implies that both the components of DTCs and ITCs significantly affect bilateral trade flows though the impact of the former is higher than the latter as shown in the last column.
Source: Author Computation.

4.3.4 Assessment of Results with the Study's Objectives

The broad objective of this study is to examine the impact of trade costs on bilateral trade flows between Nigeria and its major trading partners over the period 2005-2016. Corresponding the broad objective are the specific objectives; these are to: determine the impact of domestic and international trade costs on Nigeria's aggregate and disaggregated exports to its major trading partners; assess the impact of domestic and international trade costs on Nigeria's aggregate and disaggregated imports from its major trading partners; and evaluate the differential impact ratio of DTCs and ITCs components on aggregate and disaggregated trade flows between Nigeria and its major trading partners.

These objectives have been achieved given the results earlier presented and demonstrated in Table 4.16. It is clear from the overall analyses that both the ITCs and DTCs components of trade costs constituted by low tariff, better maritime transport, improved ratio of roads network to population, strong institutional quality, depreciation of exporter's REER/appreciation of importer's REER, less number of documents, days required and cost to export and import a 20-foot container reduce trade costs. On the other hand, high tariff, appreciation of exporter's REER/depreciation of importer's REER, more number of documents, days required and cost to export and import a 20-foot container increase trade costs, thus significantly reduce Nigeria's exports at the aggregate level. Also, at disaggregated level, agricultural, manufacturing and extractive sectors exports are all significantly affected by these trade costs components. These results corroborate with the findings of Sadikov (2007); Brooks (2008); Amiti and Javorcik (2008); Korinek and Sourdin (2009); Iwanow and Kirkpatrick (2009); Behar (2009); Iwanow (2011); Ueki (2015); and Arvis *et al.* (2015).

For imports analyses, the empirical results also confirmed that aggregate import is significantly reduced due to high trade costs constituted by both ITCs and DTCs components. The same scenario is found for imports at the disaggregated level. These results are related to the finding of De (2007); Martinez-zarzoso *et al.* (2007); Bugel (2010); Hoekman and Nicita (2011); Bourdet and Persson (2011 & 2012) and Singh *et al.* (2015). Generally, these results reveal that high trade costs inhibit bilateral trade flows between Nigeria and its major trading partners both at aggregate and

disaggregated levels and vice-versa. Overall, the results correspond with the findings of Abe & Wilson, 2009; Deen-Swarray *et al*., 2012; Bandyopadhyay & Roy, 2007 and Bandyopadhyay *et al.,* 2015.

This study is basically driven by H-O model which assumes free and absence of trade impediments. This can only hold if a country could operate in autarky, such that it has comparative advantage in every good. Based on the findings of this study, the key results are contrary to the basic assumptions of H-O model. This is because, in reality, a country cannot have a comparative advantage in every goods. Thus, for a country to engage in international trade, there are associated costs which are incurred both locally and internationally. These costs are referred to as "total trade costs" that tend to inhibit trade flows between or among the trading partners. Finally, from the overall analyses, it is clearly shown that the components of DTCs are more important than ITCs components on bilateral trade flows between Nigeria and its major trading partners. ThissupportstheargumentofHoekman and Nicita (2011) who found that domestic regulatory measures are of equal if not greater importance in influencing trade flows.

Table 4.16: Achievement of study's Objectives

Study's objectives	Results	Remarks
Objective 1:determine the impact of domestic and international trade costs on Nigeria's aggregate and disaggregated exports to its major trading partners.	The objectives are achieved with the results presented in **section 4.3.1.1- 4.3.1.4.** It is found that low trade costs increase bilateral trade flows. On the other hand, high trade costs reduce **bilateral exports**.	It is inconsistence with neo-clasical trade theory under which the H-O is derived. However, the results are consistence with the findings of Sadikov (2007); Brooks (2008); Amiti and Javorcik (2008); Korinek and Sourdin (2009); Iwanow and Kirkpatrick (2009); Behar (2009); Iwanow (2011); Ueki (2015); and Arvis *et al.* (2015).
Objective 2: assess the impact of domestic and international trade costs on Nigeria's aggregate and disaggregated imports from its major trading partners.	The objectives are achieved with the results presented in **section 4.3.2.1- 4.3.2.4.** It is also found that low trade costs increase bilateral trade flows. Conversely, high trade costs **r**educe **bilateral imports.**	It is inconsistence with the theory. However, the empirical results corroborate with the findings of De (2007); Martinez-zarzoso *et al.* (2007); Bugel (2010); Hoekman and Nicita (2011); Bourdet and Persson (2011 & 2012) and Singh *et al.* (2015).
Objective 3: evaluate the differential impact ratio of DTCs and ITCs components on aggregate and disaggregated trade flows between Nigeria and its major trading partners.	The achievement of objective 3 is demonstrated in section **4.3.1.1-4.3.2.4,** but summarized in **section 4.3.3 (Page 231-232).**	It is inconsistence with the theory. However, the results validate the findings of Hoekman and Nicita (2011).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents summary, conclusion and recommendations of the study. Based on the results obtained, recommendations were made with a view to enhancing Nigeria's competitiveness in international trade arena.

5.1 Summary

Tariff has been singled out as the main trade barrier among trading countries. However, non-tariff barrier measures remain substantial. In recent time, trade costs associated with poor state of infrastructure, poor institutional quality and more importantly, internal trade and transaction costs which reflects domestic economic environment, have devastating impact on the competitiveness of countries to participate actively in international trade.

This thesis attempted to investigate the impact of domestic and international trade costs on bilateral trade flows between Nigeria and its major trading partners. In doing this, five major theories of trade were reviewed. These theories include: Classical trade theory, neo-classical trade theory, simple "iceberg" partial equilibrium model, the "new trade theory" (monopolistic competition) and heterogeneous firms' trade theory (Melitz model). The H-O model and specific factors (SF) model are the two models that emerged under the neo-classical trade theory. The two models assumed there is free and absence of trade barriers. The H-O model was adopted as theoretical framework for this study, although with some modificationto incorporate the component of trade costs as a determinant of trade flows.

In order to investigate the impact of domestic and international trade costs on aggregate and disaggregated exports and imports, the study employed gravity model as a veritable tool mostly used to examine the functional relationship between and among countries and their trading partners. Due to endogeneity problem suspected in the models, the study employed panel instrumental variables (IV) estimator, precisely

pooled two-stage least squares (2SLS) technique while using Hausman test as a model selection criteria to choose between fixed effect and random effect models. These estimation procedures were carried out in respect of the aggregate and disaggregate (agricultural and manufacturing sectors) exports on one hand and imports on the other hand. However, PPML and fixed effect PPML were used particularly to deal with the issue of zero trade flows presence in the extractive sector exports and imports. Also, different estimations were done for the periods with TFA (2005-2016) and period before the TFA (2005-2013). Also, the impact of trade costs was analysed at both aggregate and sectoral levels.

For trade costs measures, the study used the four measures of trade costs identified in the literature. The four measures include: trade policy barrier measures, trade-related infrastructure measures, border-related (domestic regulatory) measures and institutional quality measures. In general, all these measures were classified into two components (i.e., ITCs and DTCs components) in order to determine their differential impacts ratio on exports and imports.

In terms of sampling, twenty major trading partners of Nigeria were selected. The major trading partners covered in the sample include: Belgium, Brazil, China, Cote d'Ivoire, France, Germany, Ghana, India, Italy, Japan, Netherlands, Norway, Singapore, South Africa, Spain, Sweden, Turkey, UAE, UKand US. In aggregate, bilateral trade relation between Nigeria and these countries accounted for about 70 percent of total bilateral trade flows during the period. The study covered the periods between 2005 and 2016.

The results revealed that both the components of DTCs and ITCs significantly affected bilateral trade flows between Nigeria and its major trading partners. From the analysis of the exports models, it is clearly shown that the significant impact of DTCs component on aggregate, agricultural, manufacturingand extractive exports is higher relative to the component of ITCs. Also, in the imports models, the results of the analysis revealed greater impact of DTCs component on aggregate, agricultural, manufacturingand extractive imports.

5.2 Conclusion

Evidence from the analysis of the study shows that the attention of policy debates is more on non-tariff measures, trade-related infrastructure measures, institutional quality measures and particularly on border-related (or domestic regulatory) measures. In the thesis, we investigated the impact of both DTCs and ITCs, and then compared their differential impacts ratio on bilateral trade flows between Nigeria and its major trading partners. The key findings indicate that both the components of ITCs (tariff, REER and maritime transport) and DTCs (ratio of total roads network to total population, institutional quality, required number of documents,time and cost to export and import) had significant impact in increasing/reducing the volume of trade flows between Nigeria and its major trading partners. However, the significant impact of DTCs components is greater than that of the ITCs components.

In terms of differential impacts ratio between the components of ITCs and DTCs, the findings show that the significant impact of DTCs components on aggregate, agricultural, manufacturing and extractive exports is greater, constituting 57.5 percent, 63.5 percent, 74.0 percent and 62.0 percent while the component of ITCs accounted for 42.5 percent, 36.5 percent, 26.0 percent and 38.0 percent, respectively. In the import models, the results of the analysis also reveal higher significant impact of DTCs on aggregate imports (52.3 percent), agricultural imports (52.0 percent), manufacturing imports (62.0 percent) and extractive imports (61.0 percent). On the other hand, the impact of ITCs component on aggregate, agricultural, manufacturing and extractive imports recorded 47.7 percent, 48.0 percent, 38.0 percent and 39.0 percent, respectively. This is in line with the findings of Hoekman and Nicita (2011) that domestic regulatory measures may be of equal if not greater importance in reducing trade flows. From the overall analyses, it is clear that the impact of reducing trade costs associated with DTCs component (ratio of total roads network to total population, quality of institutions, number of documents, days and cost by both exporter and importer) could yield higher payoff than further reductions in the ITCs component such as tariffs and non-tariff measures, or seeking additional trade preferences.

Furthermore, the results show that unilateral actions of exporting and importing countries are required to place higher priority on trade policies that could eliminate all

trade bottlenecks and promote bilateral trade relations. This is because the benefits associated with trade facilitation or reduced trade costs could only be achieved maximally if conscious effort (complementary effort) is undertaken by each of the trading partners. For instance, an improvement in the level of infrastructure development and existence of strong institutional setup coupled with creation of enabling business environment in the exporting country should be complemented with similar efforts in the importing country.

5.3 Contribution to Knowledge

In Africa, there is dearth of studies on trade costs and bilateral trade flows that can effectively inform policy making, address obstacles to international trade flows between Nigeria and its trading partners. Also, the study contributes positively to knowledge apart from the empirical evidence by disaggregating trade costs component into ITCs and DTCs. It contributed theoretically through the introduction of total trade costs disaggregated into ITCs and DTCs into the H-O model by relaxing the assumption of free trade. This also leads to the modification of the methodology adopted by including the combination of the four measures of trade costs identified in the literature so as to see the disaggregated impact of each component on trade flows. Finally, this study will serve as input to policy making, allowing stakeholders to understand how trade costs is considered a major determinant of trade flows.

5.4 Recommendations

This study has confirmed that focusing more attention on policy measures that could facilitate trade or reduce trade costs would produce large trade gains. From the findings, the policy measures that require greatest attention include trade-related infrastructure measures (increase the stock of roads network and improved the status of maritime transport), institutional quality measures (existence of sound and improved institutional environment), and more importantly border-related measures (reducing trade complexities and inefficiency associated with doing business cost of trading). Based on the findings of this study, the following recommendations are made:

National government through the Nigeria Customs Services (NCS) should ensure effective implementation of trade facilitation reforms, in particular, doing business requirements for cross-border trade constituted by bureaucratic processes. Also, ministry of industry, trade and investment should monitor and evaluate the timing for clearing goods and costs involved at the various ports. In addition, the Presidential Enabling Business Environment Council (PEBEC) set up by the Federal Government of Nigeria should be strengthened through expanding their operational offices, personnel and equipment in order to enable them fast-track their operations to get things done without much delay. All these will further make Nigerian business environment more competitive and ensure more rewarding outcomes. Such efforts will also enable Nigeria to be highly competitive with those of her trading partners that are mostly efficient in their trading environment.

The study confirmed from the findings that improved status of maritime transport and increased ratio of total roads network to total population contribute significantly to trade costs reduction thus improving country's trade performance. The findings showed that both at the aggregate and sectoral analyses, maritime transport and ratio of roads network to population were negative, and by implication hindered trade flows. To avert this situation, there is therefore the need for Government to commit to a long-term and consistent funding maintenance and improvement of trade-related infrastructures. As a matter of ensuring both effective and efficient trade performance at national level, the Nigerian maritime administration and safety agency (NIMASA) should come up with necessary implementing reforms in maritime services. This will guarantee easy movement of goods and services and thus provide net positive welfare effect on Nigerians.Also, the Federal government agency for roads maintanance (FERMA)[28] should embark on construction, expansion and connectivity of more roads infrastructure in the country as increase in the quality of roads transport ensure trade performance. Since investment in maritime transport and road network are economically viable long-term projects, Nigeria Government should make efforts to involve private-sector participation through Public Private Partnership (PPP) to finance such projects. Such an arrangement will enable private sector organisations to apply their skills and experience to develop trade-related infrastructure as well as mobilize required finances for such investments.

[28]FERMA means Federal Roads Maintenance Agency.

One major findings of the study is that quality of institutions (associated with corruption, lack of rule of law and unethical behaviour in the public and private sectors) is also an impediment to trade. There is therefore a need for Government to adopt more preventive measures to curtail corrupt practices, especially through the use of technology and advocacy. In addition, strengthening all relevant law enforcement agencies is highly required so as to detect, prosecute and punish corrupt, criminal and illegal acts within the limits of the law on exporting and importing activities in Nigeria.

These undoubtedly would enable Nigeria to reap the benefits of reduced trade costs, increase the volume of trade, improve the country's competitiveness in the international trade arena and, consequently, improve the welfare of the people in Nigeria and those of its traing partners.

5.5 Limitations of the Study

In the course of conducting this study, several challenges were encountered which may have had significant impact on the outcome of this study. First, examining the impact of trade costs on bilateral trade flows is macroeconomic in nature. Such requires the use of bilateral trade data. Bilateral trade data is only available for merchandise trade but not available for services trade. This limits the coverage of the study to merchandise trade alone. Also, time length of this study is short and this is due to the available data, particularly the doing business indicator which compilation started in 2005. In addition to this, the estimations conducted covered only pre-TFA period (2005-2013) and full period (2005-2016). However, the estimation for the post-TFA period (2014-2016) was not conducted due to the very short period involved. This limits the robustness of the analysis. In most of the pair-wise period estimations, at least, one doing business indicator was omitted. This is due to the problem of little real time series variation as available data are constant over time. Finally, the study does not cover the indirect measures of trade costs due to unavailability of quantitative data for non-tariff barriers across countries and time. Meanwhile, the limitations isolated do not limit the usefulness of the study.

5.6 Suggestions for Further Research

Future studies are required to further explore the relationship between trade costs and bilateral trade flows. Such studies may expand or reduce the scope than this study. The scope of this study covers only the full period under consideration (2005-2016) and pre-TFA period (2005-2013). Future studies could investigate the impact of post-TFA on bilateral trade flows between trading partners. In addition, other methodologies can be used apart from gravity model adopted for this study. It is worth noting that the measures of trade costs are wide, future studies may therefore include other sources and give further classification apart from ITCs and DTCs used in this study. These suggestions are expected to provide a more detailed examination of the impact of trade costs on bilateral trade flows between and among trading partners than what has been achieved in this study.

REFERENCES

Abe, K.,& Wilson, J. S. 2008. Governance, corruption and trade in the Asia Pacific Region, Washington DC: *World Bank, Policy Research Working Paper No. 4731*.

Abe, K., &Wilson, J. 2009. Weathering the storm: Investing in Port Infrastructure to lower trade costs in East Asia, *World Bank Policy Research Working Paper 4911*.

Abioye, O., Shubber, K., & Koenigsberger, J. 2016. Evaluating the role and impact of railway transport in the Nigerian economy, options and choices: Case of Nigerian Railway Corporation. *AshEse Journal of Economics.*Vol. 2(4), pp. 103-113.

Ackah, C., Turkson, F. E., & Opoku, K. 2012. Trade costs and intra-regional trade flows in ECOWAS. *Journal of West Africa Integration,* 1(1), 1-43.

Ackah, C., Turkson, F. E., & Opoku, K. 2013. Measuring trade costs in Economic Community of West African States (ECOWAS). *Modern Economy*, 4(1), 56-65: Retrieved April 20, 2016 from: http://dx.doi.org/10.4236/me.

Adewuyi, A. O., &Bankole, A. S. 2012. Are there potential economic benefits from China-Nigeria trade agreements? *African Journal of Economic Policy,* 19(1), 15-50.

Ahn, J., Khandelwal, A. K., & Wei, S. 2010. The role of intermediaries in facilitating trade. *NBER Working Paper 15706:*Retrieved April 10, 2015 from: http://www.nber.org/papers/w 15706.

Åkesson, J., &Karlberg, L. 2015. Trade facilitation: Bringing Kazakhstan closer to the EU. B.sc Thesis, Department of Economics, Lund University.

Alesina, A., Barro, R. J., &Tenreyro, S. 2002. Optimal currency areas, NBER Macroeconomics annual, 17, 301-345: Retrieved April 10, 2015 from https://doi.org/10.1086/ma.17.3585292.

Ali, S. 2016. Trade costs and potential: Removing barriers to growth in Pakistan. *International Growth Centre,* 1-5. Retrieved May 12, 2017 from:http://www.theigc.org/blog/ trade-costs-and-trade-potential-in-pakistan/

Amiti, M.,& Javorcik, B. S. 2008. Trade costs and location of foreign firms in China. *Journal of Development Economics,*85(1-2), 129–149.

Anderson, J. E. 1979. A Theoretical Foundation for the Gravity Equation. *American Economic Review,*69(1), 106-116.

Anderson, J. E. 2011. The Gravity model.*Annual Review of Economics,* 3(1), 133–160.

Anderson, J.,& Neary, P. 1994. Measuring the restrictiveness of trade policy, *World Bank Economic Review,* 8, 151-169.

Anderson, J. E.,& Marcouiller, D. 2000. Insecurity and the pattern of trade: An empirical investigation. *Revision of NBER Working Paper #7000.*

Anderson, J. E., & Marcouiller, D. 2002. Insecurity and the pattern of trade: An empirical investigation. *Review of Economics and Statistics,* 84(2), 342-352.

Anderson, J. E.,& van Wincoop, E. 2003. Gravity with gravitas: A solution to the border puzzle, *American Economic Review,*93(1), 170-192.

Anderson, J.,& Van Wincoop, E. 2004. Trade costs. *Journal of Economic Literature,* 42(3), 691-751.

APEC. 1997. The impact of trade liberalization in APEC, 97-CT-01.2, APEC: Singapore.

Arkolakis, C. 2010. Market penetration costs and the new consumer's margin in international trade. *Journal of Political Economy,*118(6), 1151-1199.

Arvis, J. F., Duval, Y., Shepherd, B.,& Utoktham, C. 2013. Trade costs in the developing world: 1995–2010. Washington DC: *World Bank, Policy Research Working Paper 6309.*Retrieved July 11, 2016 from:http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-6309.

Arvis, J. F., Saslavsky, D., Ojala, L., Shepherd, B., Busch, C., & Raj, A. 2014. Connecting to compete: Trade logistics in the global economy. Washington D.C.: World Bank. Retrieved April 23, 2016 from: http://lpi.worldbank.org/sites/default/files/LPI_Report_2014.pdf.

Arvis, J. F., Duval, Y., Shepherd, B., Utoktham, C., & Raj, A. 2015. Trade costs in the developing world: 1995-2012. *World Trade Review*.

Bacchetta, M. 2007. *Releasing Export Supply Constraints.* AERC, mimeo.

Bacchetta, M., Cosimo, B., Cadot, O., Fugazza, M., Grether, J., Helble, M., Nicita, A., & Piermartini, R. 2012. A Practical guide to trade policy analysis. Retrieved May 20, 2015 from: http://www.wto.org/english/res_e/publications_e/wto_unctad12_e.pdf].

Bagai, S., Newfarmer, R., & Wilson, J. 2004. Trade facilitation: using WTO disciplines to promote development. *World Bank Trade Note*, 15(10).

Baier, S. L., & Bergstrand, J. H. 2001. The growth of world trade: tariffs, transport costs, and income similarity. *Journal of international Economics*, 53(1), 1-27.

Baier, S. L., & Bergstrand, J. H. 2009. Bonus vetus OLS: A simple method for approximating international trade-cost effects using the gravity equation. *Journal of International Economics*, 77(1), 77-85.

Baier, S. L., Kerr, A., & Yotov, Y. V. 2017. Gravity, distance, and international trade. *CESifoWorking Paper, No. 6357,* Centre for Economic Studies and Ifo Institute (CESifo), Munich.

Baldwin, R. E. 1971. Determinants of the commodity structure of US trade. *The American Economic Review*, 61(1), 126-146.

Baldwin, R. E. 1979. Determinants of trade and foreign investment: Further evidence. *The Review of Economics and Statistics*, 40-48.

Baldwin, R.,& Venables, A. J. 2013. Spiders and snakes: Offshoring and agglomeration in the global economy. *Journal of International Economics*, 90(2), 245-254.

Bandyopadhyay, S., & Roy, S. 2007. Corruption and trade protection: evidence from panel data, *Federal Reserve Bank of St. Louis Working Paper 2007-022A.*

Bandyopadhyay, S., Roy, S., & Liu, Y. 2015. Contract enforcement, corruption controls and other institutions affect trade, too. *The Regional Economist*, 23(2), 10-11.

Bankole, A. S., Olasehinde, N., & Raheem, A. 2012. ECOWAS trade liberalization scheme (ETLS) and its impact on Intra-Regional Trade. *Journal of West African Integration*, 1(1), 86-124.

Behar, A. 2009. *De Bonus Vetus OLS:* Approximating the international trade cost effects of export documentation. *FREIT Working Paper #37*.

Behar, A., Nelson, B. D., &Manners, P. 2009. Exports and logistics, *Oxford Department of Economics Discussion Paper,* No.439.

Behar, A., & Venables, A. J. (2011). Transport costs and international trade. In *A handbook of transport economics*. Edward Elgar Publishing.

Bergstrand, J. H. 1985. The gravity equation in international trade: some microeconomic foundations and empirical evidence. *The review of economics and statistics*, 67(3), 474-481.

Bergstrand, J. H. 1989. The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade. *The review of economics and statistics*, 71(1), 143-153.

Bergstrand, J. H. 1990. The Heckscher-Ohlin-Samuelson model, the Linder hypothesis and the determinants of bilateral intra-industry trade. *The Economic Journal*, 100(403), 1216-1229.

Bergstrand, J. H., & Egger, P. 2013. Gravity equations and economic frictions in the world economy. In *Palgrave Handbook of International Trade* (pp.532-570). Palgrave Macmillan, London.

Bernard, A. B., Jensen, J. B., & Schott, P. K. 2006. Trade costs, firms and productivity. *Journal of Monetary Economics*, 53(5), 917-937.

Bini-Smaghi, L. 1991. Exchange rate variability and trade: why is it so difficult to find any empirical relationship?. *Applied economics*, 23(5), 927-936.

Bougheas, S., Demetriades, P. O., & Morgenroth, E. L. 1999. Infrastructure, transport costs and trade. *Journal of International Economics*, 47(1), 169-189.

Bourdet, Y., & Persson, M. 2012. Completing the EU customs union: The effects of trade procedure harmonization. *Journal of Common Market Studies,* 50(2), 300-314.

Bourdet, Y., & Persson, M. 2011. Reaping the benefits of deeper Euro-Med integration through trade facilitation.*IFN Working Paper No. 881*

Bourquin, P., & Heal, A. 2016. Removing obstacles to low value consignments trade for Asia-Pacific small and medium-sized enterprises. United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). *Trade Insights,No. 18.*

Brooks, D. H. 2008. Regional cooperation, infrastructure, and trade costs. *ADBI working paper series, No. 123*.

Brooks, D. H., & Stone, S. F. 2010. Infrastructure and trade facilitation in Asian APEC. *Asian Development Review,*27 (1), 135-159.

Brooks, D., & Ferrarini, B. 2010. Changing trade costs between People's Republic of China and India.*ADB Economics Working Paper Series, No. 203.*

Bügel, M. 2010. Institutions, uncertainty and the intensive margin in trade. *Sciences Po (GEM) &*.

Busse, M. 2003. Tariffs, transport costs and the WTO Doha Round: The case of developing countries. *Estey Journal of International Law and Trade Policy*, 4(1), 15-31.

Buyonge, C., & Kireeva, I. 2008. Trade facilitation in Africa: challenges and possible solutions. *World Customs Journal*, 2(1), 41-54.

Canning, D. 1998. A database of world stocks of infrastructure, 1950–95. *The World Bank Economic Review*, 12(3), 529-547.

Caesar, D. L. 2010. *Trade facilitation in seaports-A thorough survey of the Ghana Gateway Project* (Doctoral dissertation, Netherlands Maritime University).

Carballo, J., Schaur, G. & Volpe-Martincus, C. 2017. Transportation and trade interactions: A trade facilitation perspective. *Inter-American Development Bank (IDB) Working Paper Series No. IDB-WP-791.*

Central Bank of Nigeria. 2006.*International Economic Cooperation.* Retrieved May 05, 2011 from: http://www.cenbank.org/monetarypolicy/ecowas.asp

Central Bank of Nigeria. 2014. Central Bank of Nigeria statistical bulletin.

Chaney, T. 2008. Distorted gravity: the intensive and extensive margins of international trade. *American Economic Review*, 98(4), 1707-21.

Christie, E. 2002. Potential trade in South-East Europe: a gravity model approach. *SEER-South-East Europe Review for Labour and Social Affairs*, (04), 81-101.

Ciuriak, D., Lapham, B., Wolfe, R., Collins-Williams, T., & Curtis, J. M. 2011. New-new trade policy. *Queen's Economics Department Working PaperNo. 1263.*

Clark, X., Dollar, D., & Micco, A. 2004. Port efficiency, maritime transport costs, and bilateral trade. *Journal of development economics*, 75(2), 417-450.

Coe, D.T., Subramanian, A.,& Tamirisa, N.T. 2002. The missing globalisation puzzle, *IMF Working Paper* WP/02/171.

Davis, D. R., & Weinstein, D. E. 1998.Market access, economic geography, and comparative advantage: an empirical assessment. *National Bureau of Economic Research (Cambridge, MA) Working Paper No. 6787.*

De, P. 2007. Impact of trade costs on trade: Empirical evidence from Asian Countries. *Asia-Pacific Research and Training Network on Trade Working Paper Series, No. 27*

Deardorff, A. 1998. Determinants of bilateral trade: does gravity work in a neoclassical world? In *The regionalization of the world economy* (pp. 7-32). University of Chicago Press.

Deen-Swarray, M., Adekunle, B., & Odularu, G. 2012. Infrastructure development and intra-regional trade: the case of ECOWAS. *Journal of West African Integration*, 1(1), 161-186.

Dennis, A., & Shepherd, B. 2007. Trade costs, barriers to entry, and export diversification in developing countries. *The World BankPolicy Research Working Paper 4368.*

Djankov, S., Freund, C.,& Pham, C. S. 2006. Trading on time. The World Bank. *Policy Research Working Paper No. 3909.*

Dougherty, C. 2011. *Introduction to econometrics*. Fourth edition, Oxford University Press.

Dunn, R. M.,& Mutti, J. H. 2004. *International Economics.* Fifth edition.

Duval, Y., & Utoktham, C. 2011a. Intraregional trade costs in Asia: A primer. *Asia-Pacific Development Journal,*18(2), 1-23.

Duval, Y., & Utoktham, C. 2011b. Trade costs in the India-Mekong Subregion: Identifying policy priorities for trade facilitation. Trade and Investment Division. *Staff Working Paper, 411.*

Duval, Y., & Utoktham, C. 2012. Trade costs in Asia and the Pacific: Improved and sectoral estimates. ESCAP Trade and Investment Division. *Staff Working Paper No. 511.*

Eaton, J., & Kortum, S. 2002. Technology, geography, and trade. *Econometrica*, 70(5), 1741-1779.

Eaton, J., Kortum, S.,& Kramarz, F. 2011. An anatomy of international trade: Evidence from French firms, *Econometrica* 79(5), 1453-1498.

Engel, C. 2002. Comment on Anderson and van Wincoop in Brookings Trade Forum 2001. *Washington: The Brookings Institution*.

Evans, C. L. 2003.The economic significance of national border effects, *American Economic Review* 93(4), 1291-312.

Evenett, S. J.,& Keller, W. 1998. On theories explaining the success of the gravity equation. *National Bureau of Economic Research Working Paper No. 6529.*

Evenett, S. J.,&Keller, W. 2002. On theories explaining the success of the gravity equation.*Journal of Political Economy* 110(2), 281–316.

Ezzat, A. M. 2015. Logistics costs as a barrier to trade: A case study of Arab non-oil exports to Brazil. The international maritime transport and logistics conference (MARLOG 4). A sustainable development perspective for mega projects, 21-31, 2015.

Falvey, R., Greenaway, D., & Yu, Z. 2006. Extending the Melitz model to asymmetric countries.*The University of Nottingham Research Paper Series No. 2006/07.*

Feenstra, R. C., Markusen, J. R., &Rose, A. K. 1998. Understanding the home market effect and the gravity equation: The role of differentiating goods. *National Bureau of Economic Research Working Paper 6804.*

Feenstra, R. C., Markusen, J. R., & Rose, A. K. 2001. Using the gravity equation to differentiate among alternative theories of trade. *Canadian Journal of Economics/Revue canadienne d'économique*, 34(2), 430-447.

Feenstra, R. C. 2004. Advanced international trade: theory and evidence.Princeton, NJ: Princeton University Press.

Feenstra, R. C. 2010. Measuring the gains from trade under monopolistic competition.*Canadian Journal of Economics/Canadian Economics Association* 43(1), 1-28.

Foster, V.,& Pushak, N. 2011. Nigeria's Infrastructure: A continental perspective. Africa Infrastructure Country Diagnostic; World Bank, Washington, DC. *World Bank.*Retrieved April 20, 2016 from: https://openknowledge.worldbank.org/handle/10986/27257 License: CC BY 3.0 IGO.

Freund, C., & Rocha, N. 2010. What constrains Africa's exports? *The World Bank Economic Review,*25(3), 361-386.

Frankel, J. A. 1997. Regional trading blocs in the world economic system. Washington, D.C.: Institute for International Economics.

Francois, J.,& Manchin, M. 2007. Institutions, infrastructure, and trade. *The World Bank Policy Research Working Paper No. 4152.*

GATT 1994. The results of the Uruguay Round.

Gaurav, A.,& Mathur, S. K. 2015. Trade costs between India and the European Union. *The Journal of Industrial Statistics,* 4(2), 178 – 193.

Gaytaranov, J., Gunter, L. F., & Stegelin, F. E. 2013. Cost of trade impacts on transition country exports. A selected paper prepared for presentation at the Southern Agricultural Economics Association (SAEA) Annual Meeting, Orlando, Florida, 3-5 February 2013.

Gomez-Herrera, E., 2013. Comparing alternative methods to estimate gravity models of bilateral trade. *Empirical Economics,* 44(3), 1087-1111.

Gould, D. M. 1994. Immigrant links to the home country: empirical implications for US bilateral trade flows. *TheReview of Economics and Statistics,*76(2), 302-316.

Grainger, A. 2008. Customs and trade facilitation: from concepts to implementation. *World Customs Journal,*2(1), 17-30.

Greenaway, D., McGowan, D.,& Milner, C. 2009.Trade costs and trade composition: multi-country and product evidence on sources of comparative advantage. University of Nottingham.

Hanson, G.,& Xiang, C. 2008. Testing the Melitz model: an application to US motion picture exports. *NBER Working Paper 14461.*

Harrigan, J. 1993.OECD imports and trade barriers in 1983.*Journal of International Economics,*35(1-2), 91-111.

Head, K., & Mayer, T. 2004.The empirics of agglomeration and trade, chapter 59 in the handbook of regional and urban economics 4, edited by V. Henderson and J.F. Thisse.

Head, K., & Ries, J. 1998. Immigration and trade Creation: econometric evidence from Canada.*Canadian Journal of Economics,* 31(1), 47-62.

Head, K.,& Ries, J. 2001. Increasing returns versus national product differentiation as an explanation for the pattern of US-Canada trade. *American Economic Review,* 91(4), 858-876.

Heckscher, E. F., 1919. Utrikshandelns verkan pa inkomstfoerdelningen, *Ekonomist Tradskrift*, 21, Del 2, 1–32 (The effect of foreign trade on the distribution of income, in H. S. Ellis and L. A. Metzler eds., *Readings in the Theory of International Trade*, 1949, Philadelphia: Blakiston, 272–300).

Helble, M., Shepherd, B.,& Wilson, J. S. 2007. Transparency and trade facilitation in the Asia Pacific: Estimating the gains from reform. Department of Foreign Affairs and Trade.

Helpman, E. 1981.International trade in the presence of product differentiation, economies of scale and monopolistic competition: A Chamberlin-Heckscher-Ohlin approach. *Journal of International Economics,*11(3), 305–340.

Helpman, E., &Krugman, P. R. 1985. Market structure and foreign trade: Increasing returns, imperfect competition, and the international economy. Cambridge Mass, MIT Press.

Helpman, E., Melitz, M. J.,& Yeaple, S. R. 2004. Export versus FDI with heterogeneous firms. *The American Economic Review,* 94(1), 300-316.

Helpman, E., Melitz, M.,& Rubinstein, Y. 2008. Estimating trade flows: trading partners and trading volumes. *TheQuarterly Journal of Economics*. 123(2), 441-487.

Hoekstra, R. 2013. Boosting manufacturing firms' exports? The role of trade facilitation in Africa, *IEE Working Paper 197*. University of Bochum.

Hoekman, B.,& Nicita, A. 2011. Trade policy, trade costs, and developing country trade, *World Development*, Elsevier, 39(12), 2069-2079.

Hopenhayn H. A. 1992. Entry, exit and firm dynamics in long-run equilibrium. *Econometrica: journal of the Econometric Society*, 60(5), 1127-1150.

Hoppe, M., Rippel, B., Gamberoni, E., Reyes, J. D., Stryker, D., Amin, M., Mohamadou, A., Foleu, L., Ndumbe, L.,& Ahone, P. 2013. Estimating trade flows, describing trade relationships, and identifying barriers to cross-border trade between Cameroon and Nigeria.*Working Paper 78283, World Bank, Washington, DC.*

Hsiao, C. 1986. Analysis of panel data. Cambridge: Cambridge University Press.

Hufbauer, G. 1991. World economic integration: the long view.*International Economic Insights,* 2(3), 26-27.

Hummels, D. 2001. Time as a trade barrier.*GTAP Working Papers 1152*, Centre for Global Trade Analysis, Department of Agricultural Economics, Purdue University.

Hummels, D. 2007. Transportation costs and international trade in the second era of globalization. *Journal of Economic Perspectives,*21(3), 131–154.

Hummels, D., & Levinsohn, J. 1995. Monopolistic competition and international trade: reconsidering the evidence.*TheQuarterly Journal of Economics,*110(3), 799–836.

Hummels, D.,& Lugovskyy, V. 2006. Are matched partner trade statistics a usable measure of transportation costs? *Review of International Economics,* 14(1), 69-86.

Hummels, D. L. & Schaur, G. 2013. Time as a Trade Barrier. *American Economic Review,* 103(7): 2935–2959. http://dx.doi.org/10.1257/aer.103.7.2935

International Monetary Fund. 2015. *World Economic and Financial Surveys World Economic Outlook Database.* Washington (October).

Institute of Economic Affairs, 2006. Trade facilitation: Issues for Kenya and Kenya's position at the WTO. *IEA Research Paper Series* No.5

Iwanow, T. 2011. Institutions and trade flows: a sectoral gravity model approach. A Thesis submitted to the University of Manchester for the degree of Doctor of Philosophy in Development Policy and Management in the Faculty of Humanities. Chapter 4, 85-102. Retrieved April 22, 2016 from: http://www.manchester.ac.uk/library/aboutus/regulations).

Iwanow, T.,& Kirkpatrick, C. 2009. Trade facilitation and manufacturing exports: Is Africa different? *World Development,*37(6), 1039-1050.

Jacks, D. S., Meissner, C. M.,& Novy, D. 2008. Trade costs, 1870-2000. *American Economic Review,* 98(2), 529-534.

Jacks, D. S., Meissner, C. M.,& Novy, D. 2010. Trade costs in the first wave of globalization. *Explorations in Economic History,* 47(2), 127–141.

Jalerajabi, M., & Moghaddasi, R. 2014. Investigation of effective factors on bilateral trade costs of agricultural product (Case Study: Iran's bilateral trade with developing countries). *International Journal of Resistive Economics*, 2(3), 51-59.

Jones, R. W. 1971. A Three-factor model in theory, trade, and history.Trade, balance of payment and growth: Essays in honour of Charles P. Kindleberger (North-Holland, Amsterdam), 3-21.

Kareem, O. I. 2009. Trade restrictions and Africa's exports.A paper presented at the 2009 Centre for the Studies of African Economies (CSAE) Conference in the University of Oxford, England. No. 113675.

Kaufmann, D., Kraay, A., & Zoido-Lobaton, P. 1999a. Aggregating governance indicators.
World Bank Working Paper No. 2195.

Kaufmann, D., Kraay, A., & Mastruzzi, M. 2011.The worldwide governance indicators: methodology and analytical Issues. *Hague Journal on the Rule of Law*, 3(2), 220-246.

Kee, H. L., Nicita, A.,& Olarreaga, M. 2008. Import demand elasticities and trade distortions. *The Review of Economics and Statistics,*90(4), 666–682.

Khan, I. U., & Kalirajan, K. 2011. The Impact of trade costs on exports: an empirical modeling. *Economic Modelling,*28(3), 1341–1347.

Korinek, J., & Sourdin, P. 2009. Maritime transport costs and their impact on trade. *Organisation for Economic Co-operation and Development TAD/TC/WP (2009)*, 7.Retrieved June 20, 2015 from: http://www.etsg.org/ETSG2009/papers/korinek.pdf

Kowalski, P. 2005. Impact of changes in tariffs on developing countries' government revenue. *OECD Trade Policy Working Papers, No. 18, OECD Publishing.* doi:10.1787/210755276421.

Krugman, P. 1979. Increasing returns, monopolistic competition, and international trade. *Journal of International Economics,*9(4), 469 – 479.

Krugman, P. 1980. Scale economies, product differentiation, and the pattern of trade. *American Economic Review,*70(5), 950 – 959.

Krugman, P., & Obstfeld, M. 2009. International Economics: theory and policy, 8th edition. Boston, MA: Pearson Addison Wesley.

Kurmanalieva, E. 2006. Transport costs in international trade. Retrieved December 16, 2015 from:http://www.haveman.org/EITI07/Kurmanalieva.pdf

Lakatos, A. 2016. Challenges for implementing the trade facilitation agreement. *International Trade and Investment Review.*

Lawless, M., 2010. Deconstructing gravity: trade costs and extensive and intensive margins. *Canadian Journal of Economics/Revue canadienne d'economique,* 43(4), 1149–1172.

Lee, J., & Swagel, P. 1997.Trade barriers and trade flows across countries and industries.*Review of Economics and Statistics,* 19(3), 372-382.

Limao, N and Venables, A. 2001. Infrastructure, geographical disadvantage, transport costs and trade.*World Bank Economic Review,*15(3), 451-479.

Lyakurwa, W. M. 2007. The business of exporting: transaction costs facing suppliers in Sub-Saharan Africa. Framework paper presented at the African Economic Research Consortium Collaborative Research Workshop on Export Supply Response Constraints in Sub-Saharan Africa Dar es Salaam, Tanzania, 23–24 April 2007.

Markusen, J. R.,& Wigle, R. M. 1990. Explaining the volume of North-South trade. *The Economic Journal,* 100(403), 1206-1215.

Martin, W., & Pham, C. S. 2015. *Estimating the gravity model when zero trade flows are frequent and economically determined*. The World Bank.

Martínez-Zarzoso, I., Marquez-Ramos, L., & Wilmsmeier, G. 2007. Effects of trade facilitation on Latin-American sectoral trade. Presented in the Arnoldshain Conference held in Antwerp in 2014.

Martínez-Zarzoso, I.,& Márquez-Ramos, L. 2008. The effect of trade facilitation on sectoral trade. *The BE Journal of Economic Analysis & Policy,* 8(1), Article 42. Retrieved April 06, 2016 from:http://www.bepress.com/bejeap/vol8/iss1/art42.

Márquez-Ramos, L., Martínez-Zarzoso, I., & Suárez-Burguet, C. 2012.Trade policy versus trade facilitation: an application using "Good Old" OLS" (2012). *The Open- Access, Open-Assessment E-Journal*. 6, 2012-11. Retrieved February 14, 2015 from: http://dx.doi.org/10.5018/economics-ejournal.ja.2012-11.

Mayer, W. 1974. Short-run and long-run equilibrium for a small open economy. *Journal of Political Economy,* 82, 955-967.

McCallum, J. 1995.National borders matter: Canada-US regional trade patterns. *The American Economic Review,*85(3), 615-623.

Melchior, A., Zheng, J., & Johnsen, A. 2009. Trade barriers and export potential: gravity estimates for Norway's exports. A paper written for the ministry of trade and industry, Norway.

Mele, M., & Baistrocchi, P. A. 2012.A critique of the gravitational model in estimatingthe determinants of trade flows. *International Journal of Business and Commerce,* 2(1), 13-23.

Melitz, M. 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity, *Econometrica,* 71(6),1695-1725.

Melitz, M. J.,& Ottaviano, G. I. P. 2008. Market size, trade, and productivity, *Review of Economic Studies,* 75(1), 295-316.

Meltzer, J. P. 2016. Maximizing the opportunities of the internet for international trade. In *International Centre for Trade and Sustainable Development (ICTSD) and World Economic Forum*, (2016).

Milner, C. & MCGowan, D. 2013. Trade costs and trade composition. *Economic Inquiry,* 51(3), 1886–1902.

Ministry of Budget and National Planning, 2017. Economic recovery and growth plan 2017-2020. Federal Republic of Nigeria.

Minor, P.,& Tsigas, M. 2008. Impacts of better trade facilitation in developing countries. Analysis with a new GTAP database for the value of time in trade. GTAP11th annual conference Helsinki, Finland. Research Report.

Miroudot, S., Sauvage, J.,& Shepherd, B., 2012. Trade costs and productivity in services sectors. *Economics Letters,* 114(1),36–38.

Miroudot, S., J. Sauvage, and B. Shepherd. 2013. Measuring the costs of international trade in services. *World Trade Review,* 12(4),719-735.

Moore, M. 2018. Trade costs and international trade flows: Methodologies, data, and empirical evidence. European University Institute (EUI) Working Paper RSCAS2018/05.

Mussa, M. 1974. Tariffs and the distribution of income: the importance of factor specificity, substitutability and intensity in the short and long-run. *Journal of Political Economy,* 82(6), 1191-1203.

National Planning Commission. 2015. National integrated infrastructure master plan. A Report Prepared by National Planning Commission for Federal Republic of Nigeria.

Neary, P. 1978. Short-run capital specificity and the pure theory of international trade. *The Economic Journal,* 88(351), 488-510.

Neary, J. P. 2004. Monopolistic competition and international trade theory.*The Monopolistic Competition Revolution in Retrospect*, 13(159), 317.

Nicita A.,& Olarreaga, M. 2007. Trade, production, and protection database, 1976-2004. *World Bank Economic Review,*21(1), 165-171.

Nordas, H. K.,& Piermartini, R. 2004. Infrastructure and trade. World Trade Organisation, Economic Research and Statistics Division. *Staff Working Paper ERSD-2004-04*.

Nordås, H. K., Pinali, E., & Grosso, M. G. 2006. Time and logistics as a trade barrier. *OECD Trade Policy Working Paper No. 35.*

Novy, D. 2010. Gravity Redux: Measuring international trade costs with panel data. Retrieved August15, 2015 from: http://www2.warwick.ac.uk/fac/soc/economics/ staff/faculty/novy/fast.pdf.

Novy, D. 2013. Gravity redux: measuring international trade costs with panel data. *Economicinquiry,*51(1), 101-121.

OECD 2001. Business benefits of trade facilitation – preliminary findings from literature survey, with particular focus on SMEs and developing country firms. TD/TC/WP(2001)21.

OECD 2002. Business benefits of trade facilitation. TD/TD/WP (2001)21/FINAL.

OECD 2003. Quantitative assessment of the benefits of trade facilitation. TD/TD/WP (2003) 31/FINAL, OECD, Paris.

OECD 2013. Trade Costs: What have we learned? A synthesis report. TAD/TC/WP (2013)3/FINAL.

OECD/WTO 2015. *Aid for trade at a glance 2015: Reducing trade costs for inclusive, sustainable growth*, OECD publishing, Paris. Retrieved May 31, 2017 from: http://dx.doi.org/10.1787/aid_glance-2015-en.

OECD-WTO/OMC 2017. Aid for trade - case story template.

Ohlin, B., 1933.*Interregional and International Trade*, Cambridge, Mass.; Harvard University Press.

Osnago, A., Piermartini, R., & Rocha, N. 2015. Trade policy uncertainty as barrier to trade. *WTO Staff Working Paper Economic Research and Statistics Division (ERSD) -2015-05.*

Papalia, R. B. & Bertarelli, S. 2015. Trade costs in bilateral trade flows: Heterogeneity and zeroes in structural gravity models. *The World Economy*. 38. 10.1111/twec.12259.

Perée, E., & Steinherr, A. 1989. Exchange rate uncertainty and foreign trade. *European Economic Review*, 33(6), 1241-1264.

Persson, M. 2010. Trade facilitation and the extensive margin. Research Institute of Industrial Economics. *IFN Working Paper No. 828.*

Petri, P. A.1991. Market structure, comparative advantage, and Japanese trade under the strong Yen, in Paul R. Krugman, ed., *Trade with Japan: Has the door opened wider*? Chicago: University of Chicago Press, 51–84.

Poyhonen, P. 1963. A tentative model for the volume of trade between countries, *WelwirtschaftlichesArchiv,*90(1),93-100.

Portugal-Perez, A.,& Wilson, J. S. 2008. Why trade facilitation matters to Africa? *World Bank Policy Research Working Paper 4719, Washington D.C.*

Portugal-Perez, A., & Wilson, J. S. 2009. Why trade facilitation matters to Africa. *World Trade Rev.*, 8, 379.

Portugal-Perez, A.,& Wilson, J. S. 2010. Export performance and trade facilitation reform: hard and soft infrastructure. *World Bank Policy Research Working Paper 5261, Washington D.C.*

Ricardo, D. 1817. On the Principles of Political Economy and Taxation (John Murray, London). In: Sraffa, P., Ed., The Works and Correspondence of David Ricardo, Vol. 1, Cambridge University Press, Cambridge, 1951.

Romalis, J. 2004. Factor proportions and the structure of commodity trade. *The American Economic Review,*94(1), 67–97.

Rose, A. K. 2000. One money, one market: the effect of common currencies on trade. *Economic Policy,* 15(30),7-46.

Rose, A. K., & van Wincoop, E. 2001. National money as a barrier to trade: the real case for currency union. *American Economic Review,* 91(2), 386-390.

Sadikov, A. 2007. Border and behind-the-border trade barriers and country exports. *IMF Working Paper No. 07/292.* (Washington, D.C.: International Monetary Fund).

Salvatici, L. 2013. The gravity model in international trade. African growth and development policy (AGRODEP) technical note TN-04, *Version 2.*

Samuelson, P. A. 1952. The transfer problem and transport costs: the terms of trade when impediments are absent.*Economic Journal,* 62(246), 278 – 304.

Samuelson, P.A. 1971. Ohlin was right.*Swedish Journal of Economics,* 73(4), 365-384.

Santos Silva, J. M. C.,& Tenreyro, S. 2006. The log of gravity. *Review of Economics and Statistics,* 88(4), 641-658.

Sarbjit, S., & Mathur, S. K. 2014. An empirical estimation of trade cost of India in post liberalization era. Paper presented at the fourth Indian institute of foreign trade annual conference on empirical issues in international trade. 18-19th December, Delhi.

Seck, A., 2014. How facilitating trade would benefit trade in Africa. *AERC Research Paper:* African Economic Research Consortium, Nairobi.

Schroder, P. J. H., & Sorensen, A. 2012. Second thoughts on the exporter productivity premium.*Canadian Journal of Economics,* 45(4), 1310-1331.

Shahbaz, M., Leitao, N. C.,& Butt, M. S. 2012. Pakistan intra-industry trade: A panel data approach.*International Journal of Economics and Financial Issues*, 2(2), 225-232.

Shepherd, B., 2009. Trade costs and facilitation in APEC and ASEAN: delivering the goods? Developing trade consultants.*Policy Research Capacity Building Working Paper DTC-2009-1.*

Singh, S., & Mathur, S. K. 2014. Trade costs of India within Asia: measurement and its determinants. *FREIT Working Paper, No. 746.* Retrieved April 20, 2016 from: http://www.freit.org/WorkingPapers/Papers/TradePolicyRegional/FREIT746.pdf

Singh, S., Arora, R. and Mathur, S. K. 2015. Trade costs and trade flows: a study of Asian trading partners. Presented in in the international

conference on governance and integration through free trade agreements (GIFTA) at India International Centre, New Delhi, India. Retrieved April 20, 2016 from: http://giftaproject.org/wp-content/uploads/2015/11/Sarbjit-Singh_2015-Paper.pdf.

Smith, A. 1776. An Inquiry into the Nature and Causes of the Wealth of Nations, Edwin Cannan, ed. *Library of Economics and Liberty. Retrieved March*, *9*, 2017.

Sourdin, P., & Pomfret, R. 2012. Measuring international trade costs. *World Economy,* 35(6), 740-756.

Statistics, U. N. C. T. A. D. 2017. United Nations Conference on Trade and Development. *New York*.

Suranovic, S. M. 2004. International trade theory and policy. *Trade.*Chapter 90-31. Retrieved May 17, 2015 from: http://internationalecon.com/Trade/Tch90/T90-31.php

Thangavelu, S. M. 2010. Non-tariff barriers, integration and export growth in ASEA. A preliminary draft prepared for GEP conference at University of Nottingham, Malaysia 13th and 14th January 2010.

Tinbergen, J., 1962. An analysis of world trade flows. In Tinbergen, J. (ed) *Shaping theWorld Economy.* New York: The Twentieth Century Fund.

Todaro, M. P.,& Smith, S. C. 2004. Economic development. Addison-Weskey (Pearson Education), eight edition.

Trefler, D. 1993.Trade liberalisation and the theory of endogeneous protection: an econometric study of U.S. Import policy.*Journal of Political Economy,*101(1), 138-160.

Turkson, E. F. 2012. Using observable trade data to measure bilateral trade costs in developing countries: evidence from Sub-Saharan Africa. *CREDIT Research Paper 12/06,* Nottingham School of Economics, University of Nottingham, UK.

Ukaoha, K., & Ukpe, A. 2013. The ECOWAS Trade Liberalisation Scheme: Genesis, Conditions and Appraisal. *Ecowas Vanguard*, 2(3), 1-12.

Ueki, Y. 2015. Trade costs and exportation: a comparison between enterprises in Southeast Asia and Latin America. *Journal of Business Research,* 68(4), 888–893.

US Department of Commerce, 2001. Statistical Abstract of the United States. Washington, DC: US Government Printing Office.

Vidavong, C. 2013. The Impacts of trade cost and export specialization on export: A case study - LAO PDR. *Forum for Research on Empirical International Trade (FREIT) Working Paper.*

Viner, J. 1931. Cost curves and supply curves. *Zeitschrift fur Nationalokonomie,* 3, 23-46.

Wei, S. J., 1996. Intra-national versus international trade: how stubborn are nations in global integration? *NBER Working Paper No. 5531,* Cambridge, MA

West Africa Trade Hub Technical Report (2010) *Gap Analysis ECOWAS Free Trade Area,*Technical Reports, No. 37 and 38.

Wilson, J. S. 2003. Trade Facilitation: New issues in a development context. *Trade Note No. 12,* World Bank, Washington, D.C.

Wilson, J. S., Mann, C. L., & Otsuki, T. 2003. Trade facilitation and economic development: a new approach to quantifying the impact. *World Bank Economic Review,*17(3), 367-89. Retrieved April 12, 2015 from: http://www.jstor.org/stale/3990246.

Woo, Y. P. & Wilson, J. 2000. Cutting through red tape: new directions for APEC's trade facilitation agenda. Vancouver: Asia Pacific Foundation of Canada. Retrieved June, 10, 2015 from: http://www.apec.org/Groups/Committeeon-trade-and investment/~/media/Files/ Groups/MAG/01_cti_tradefacilitatn.ashx

Wooldridge, J. M. 2012. Introductory Econometrics: A modern approach, Fifth Edition.

World Bank. 2018. World development indicators database. *Obtenido de Gross Domestic Product: databank. worldbank. org*.

World Bank. 2016. International Economics Dept. Development Data Group. *World development indicators*. World Bank.

World Bank Group. 2016. *Doing business 2016: Measuring regulatory quality and efficiency*.

World Bank. 2015. *Doing Business Report 2015*: going beyond efficiency. Washington, DC: World Bank. Retrieved November 28, 2015 from: http://www.doingbusiness.org/reports/global-reports/doing-business-2015.

World Bank, 2009. World Development Report: reshaping economic geography. The World Bank, Washington.

World Economic Forum, 2016. Global Competitiveness Report 2015-2016, WEF, *Geneva.*

World Governance Indicators database, 2017.

WTO 1998, WTO: a training package: what is trade facilitation? Viewed 2 August 2006,http://www.wto.org/english/thewto_e/whatis_e/eol/e/wto02/wto2_69.htm #note2

WTO, 1998. Structural reforms and increased transparency needed to generate trade and growth in Nigeria. *Trade Policy Reviews.*

WTO, 2004. Decision adopted by the general council on 1st August, 2004.

WTO 2011. *Trade Policy Review Report by the Secretariat Nigeria.*WT/TPR/G/247.

WTO 2015. *Trade Policy Review Nigeria,* Geneva.

WTO 2017. *Trade Policy Review Report by the Secretariat Nigeria.*WT/TPR/S/356.

World Trade Report. 2015. The theory and measurement of trade facilitation. Retrieved January, 2016 from https://www.wto.org/english/res_e/.../wtr15-2c_e.pdf

Zhai, Fan. 2008. Armington meets melitz: introducing firm heterogeneity in a global CGE model of trade. ADBI discussion paper 108. Tokyo: Asian Development Bank Institute. Retrieved November, 2015 from: http://www.adbi.org/discussionpaper/ 2008/05/23/2545.firm.heterogeneity.global.cge/

APPENDICES

Table A-1: Review of Selected Literature on the Impact of Trade Costs on Trade Flows

TRADE POLICY BARRIERS MEASURE AND TRADE FLOWS							
S/N	Authors and Year	Country and Scope	Methodology			Theoretical Framework	Findings
			Variables	Estimation Techniques	Indicators of Trade Costs		
1	Kee*et al.* (2008)	Across 78 developing and developed countries	Import value; tariff line dummies; distance; GDP	Gravity model: OLS technique	Trade restrictiveness index (TRI), overall TRI (OTRI) and market access OTRI (MA-OTRI).	Anderson and Neary (1992, 1994, 1996, 2003 and 2007)	The results reveal that as developing countries adopt more restrictive measures of trade policies, their exports are also faced with higher trade barriers. This may be elucidated by reciprocity in bilateral and multilateral trade agreements. The results further show that across countries, contributing share of NTBs to trade restrictiveness is greater relative to tariff.
2	Duval and Utoktham (2011a)	4 Asian subregions: ASEAN, SAARC, North and Central Asia, and East and North-East Asia.(1988-2008)		Elasticity approach	Tariff equivalent trade cost	Anderson and van Wincoop (2003) and Novy (2009)	The results show that tariff share of the overall trade costs for the regions accounted for about 10 percent or less. This is therefore an evidence that attention of trade policy makers and negotiators should be directed towards reducing NTBs and embark on trade facilitation measures across the regions.
3	Duval and Utoktham (2012)	107 countries- 48 of which only are Asian or South Pacific economies covering the period 1988 to 2010	Gross output; gross value added sector dummy; income group dummy.	Non-parametric models (inferential statistics (OLS) and descriptive statistics))	Comprehensive trade costs, expressed in tariff equivalent form.	Anderson and van Wincoop (2003) and Novy (2009)	Their findings reveal that while significant improvements have been made by most countries and sub-regions towards reducing trade costs, still, costs of trading among Asian sub-regions are relatively higher than costs required when trading with developed countries outside the region. Other of this finding was that tariff accounted for less than 10 percent of the CTC. At sectoral level, despite exception of tariff, costs associated with agricultural products were systematically found to surpass that of manufactured products.
4	Jalerajabi and Moghaddasi (2014)	15 developing countries (1995-2010).	Trade costs proxies; distance; tariff; time invariant variables.	Panel Gravity model: OLS technique	Tariff and distance	Anderson and van Win coop (2003)	They found that weighted average of such costs with developing partners had declined significantly by 44 percent. However, such a decline was larger for Brazil and UAE. Also, lag of agricultural bilateral trade costs variables, tariff rate and distance had positive effect on Iran's agricultural bilateral trade costs. Conversely, island and adjacency variables had negative effect.
5	Gaurav and Mathur (2015)	Bilateral TC measure for India with its entire EU trading partners (1995-2010).		micro-founded approach derived by Novy (2013)	Tariff equivalent trade cost	Anderson and van Win coop (2004) and Novy (2013)	The results confirm 20 percentage points decline of Indian tariff equivalent with EU for the period under consideration, with greatest decline experienced by Latvia and Malta.

6	Osnago *et al.*(2015)	A sample of 140 developed and developing countries (exporters).	Probability to exports; exports volume; product's export share and time invariant var.	Panel Gravity model: OLS and fixed effect OLS.	Binding overhang (water) i.e., the gap btw bound rates and effective applied tariffs.		Their findings show that an essential barrier to export was trade policy uncertainty. On average, elimination of binding overhang increased exports probability by 12 percent. The study also found higher negative impact of TPU for countries with low institutional quality.
7	Melchior*et al.* (2009)		Trade; GDP; distance and Tariffs	Gravity model: Pooled OLS, FE and RE.	Tariff		Their findings reveal that trade could increase by 4.2-12.9 billion NOK, equivalent to 1.2 to 3.7 percent of Norway's non-oil exports in 2007.
8	Kareem (2009)	African countries	Exports; tariffs; NTB; ratio of prices btw the selected African countries and their trading partners	Gravity model: GMM technique.	Tariff (weighted average ad valorem tariff) and NTB (number of times-known as coverage ratio).	Krugman (1979) and Helpman and Krugman (1985)	The result reveal that low accessibility of African exports to both markets were not limited to imposition of trade restrictions alone, but also inadequate production capacity to meet up with market access.
9	Ackah*et al.* (2013)	ECOWAS countries (1980-2003)	Tariff equivalent trade costs; bilateral trade of both countries.	Unconditional general equilibrium trade model: Average bilateral trade costs and t-test for difference in bilateral average TCs.	Tariff equivalent trade cost	Novy (2010)	The results show that an average ECOWAS countries traded with their trading partners at a tariff equivalent trade cost of 268.2 percent. This was relatively higher compared with countries from other regional blocs within and out of SSA. In respect of trade flow involving ECOWAS countries, the findings indicate that trading among average ECOWAS members involve lower trade costs relative to partners from economic blocs out of ECOWAS. However, for countries within ECOWAS, the findings reveal that Cote d'Ivoire had the lowest intra-ECOWAS trade costs compared with Ghana, Nigeria and Benin, respectively.
TRADE –RELATED INFRASTRUCTURE BARRIERS MEASURE AND TRADE FLOWS							
10	Bougheas*et al.* (1999)	European countries covering the period of 1970 to 1990	Exports; GDP (X/M); distance.	Augment Gravity model: Seemingly Unrelated Regression (SUR)	Transport costs.	A two-country Ricardian model along the lines of Dornbusch-Fischer-Samuelson (DFS, 1977).	Their findings show that even though volume of trade is positively affected by infrastructure, still their theoretical proposition emphasized that increasing volume of infrastructure were not always welfare improving. The results also demonstrate that the benefits of additional investments on high levels of infrastructure in terms of increased trade volume were outweighed by the loss in final output.
11	Hummels (2001)	The value, weight, freight and	Time costs (ocean shipping	Econometric approach: Probit model	Time costs		The estimated results indicate the probability of reducing the US imports by 1-1.5 percent from country that require extra time (day) in

		insurance charges by transport mode (m=sea, air) for U.S imports with detail by commodity groups (k), exporter (j) , and district of entry (i) for the 1974-1998 period	times); distance; days; TFP.				transport.
12	Baier and Bergstrand (2001)	16 OECD countries betweenlate 1950s and late 1980s.	Real trade flow;[29] Transport costs; tariff rates; GDP (X); importer's real GDP; distribution costs	Gravity model: OLS technique	Tariffs liberalization and transport- cost reductions		The findings reveal that roughly 67-69 percent of trade growth could be ascribed to real GDP growth, 23-26 percent of decline in tariff and preferential trade agreements (PTA), and 8-9 percent of reduced transport cost but none by income convergence.
13	Limao and Venables (2001)	103 countries in 1990	Transport costs; GDP; distance; GDPPC; infrastructure;	Gravity model: OLS estimation, Tobit	Quality of transport and communications infrastructure		From the computed estimates, trade flows elasticity with transport costs factor of around -3, confirm the importance of infrastructure variable in determining trade. The results show that deteriorating status of infrastructure from 50th to 75th percentile increases transport costs by 12 percent points and decreases traded volumes by 28 percent. In addition, the results show that poor state of infrastructure in Africa was essentially responsible for its low trade flows.
14	Busse (2003)	Developing countries			Communications and transport costs		The findings suggest that an efficient transport and services infrastructure could reduce transaction costs. This was considered a necessity towards achieving significant growth and development in the economy.
15	Brooks (2008)	Developing Asian countries		Gravity model: theory based.	Hard (physical projects) and soft (institutional) or Infrastructure development and services		The findings show that investment in infrastructure could help reduce costs of doing business, maximize growth and benefits regional integration in Asia. His findings also show that further improvements in infrastructure accompanied by trade expansion, would fascinate more investment in productive capacity, increase markets access and employment opportunities, and widen consumers' choice.
16	Amiti and Javorcik (2008)	515 manufacturing industries at a highly aggregated level in 29 Chinese provinces based on the 4 digit	Net entry of foreign firms; market access; supplier access; tariff; pop;	Non-linear least squares (nls) model: Tobit model	Transport infrastructure	Krugman and Venables (1995)	The findings show that both market and supplier's access were basically essential for foreign entry. Results further indicate that markets access mattered more in the province than other parts of China.

[29] Real trade flows-the nominal c.i.f. value of the trade flow divided by the exporter's deflator.

		Chinese Industrial Classification during the period 1998-2001	infrastructure.				
17	Abe and Wilson(2009)	Developing countries in East Asia	Import charge /weight; distance; port congestion; port infrastructure quality;	Gravity model: OLS technique and elasticity approach	Port efficiency, port infrastructure quality, port congestion and water transport.		The results of their findings reveal that high transport costs from both Japan and U.S to East Asia was due to port congestion. The analysis proposes that while port congestion in East Asia was reduced by 10 percent, transport costs could also be reduced by about 3 percent. This therefore implies that there was across-the-board tariff cut by about about 0.3 to 0.5 percent.
18	Brooks and Stone (2010)	15 countries and regions, including all APEC Asia countries.	GDP; time costs of exports.	CGE: Version 7 of the Global Trade Analysis Project (GTAP) database.	Time costs of exports.		The results show trade gains arisen from significant reduction even a comparatively modest one in trade costs. Also, the result shows that increase in the GDP of the region was as a result of diversification of trading patterns.
19	Vidavong (2013)	Applied two different models: the aggregated model (1986-2010 for export of Laos to 24 of her trading partners, while the disaggregated model(2001-2010) covered 12 main trading partners with 10 top products exported (4 digit, HS).	Real export values; GDP; GDPPC; real exchange rate; infrastructure index;	The augmented gravity model and unbalanced panel data: GLS transforming from OLS by first-order autoregressive approach and SUR techniques.	Infrastructure index (trade mobility infrastructure, TMI), Transaction cost (TRC) and geographical distance (DIS).		The findings confirm that export activities of Laos could be accelerated provided both trading countries maintained further improvement in their levels of infrastructural development. Although, the magnitude of the effect of infrastructure development was stronger for importing country than that of the exporting country. In addition, export specialization had potential to boost trade and that a 10 percent change in specialization could stimulate export growth by about 43 percent.
20	Nordås and Piermartini (2004)	138 countries (1996-2000)	Volume of imports; GDP; infrastructure; distance; time invariant variables.	Gravity model: OLS regressions	Quality of Infrastructure Indicator: Port efficiency.	Anderson and van Wincoop (2003a)	Their results also show that infrastructural quality was a major determinant of trade performance. Among infrastructural indicators, port efficiency was discovered to have had the largest impact. However, telecommunication accessibility and timeliness determined the competitiveness of clothing and automotive sectors.
21	Korinek and Sourdin (2009)	About four million data points for products at the HS-6 digit level for 42 importing countries from all 218 countries of the world.(1991 to 2007).	Value of imports; tariff; shipping costs; distance; time invariant variables.	Augment Gravity model: 2SLS and OLS techniques	Transport costs (shipping costs)	Anderson & van Wincoop (2003)	The results indicate a strong impact of maritime transport costs on trade. A 10 percent increase in maritime transport costs was estimated to 6-8 percent reduction in trade, ceteris paribus. Generally, maritime transport costs has great impact while the magnitude of changes would produce significant impact on trade flows. Also, in another model using product-level data, the results reveal that an increase in shipping costs by 10 percent would bring about a reduction in trade by 3 percent.
22	Behar and Venables (2011)	Across the World	Exports; infrastructure; distance; fuel costs; TF	Gravity model: OLS technique and elasticity approach	Infrastructure quality and trade facilitation measures	Anderson (1979) and Bergstrand (1985).	Their finding corroborate with the World Bank (2009) which emphasized the significance of broader measures trade facilitation measures as a means towards reducing transport costs and improve trade volumes across the World.

23	Seck (2014)	105 countries (with 19 from Africa) for the period 2010-2012	Exports; GDPPC; TFI; distance; tariff; infrastructure; time invariant variables.	Gravity model: Pooled OLS estimator in a panel data setting	Regulatory environment, border efficiency, physical infrastructure, and information & communication technology	Bernard et al (2006); Blyde & Iberti (2010).	His findings indicate the tendency that increased trade flows with trade facilitation is contingent on the nature of commodity being traded with, trade costs measures, export destination and the country involved in the bilateral trade relationship which costs were accounted for. Also, the finding reveals the possibility of increasing total trade from 6.8 to 15.1 percent provided average African country could be raised to the world best performing country through provision of trade reforms aiming at physical infrastructure, particularly roads.
24	Deen-Swarray*et al.* (2012)	12 West African Countries for the period 1993-2008	Total trade; exports; imports; GDP; GDPPC; distance; infrastructure index, time invariant variables.	Gravity model: Pooled model; fixed effects and random effects models	Infrastructure index (additive index of road density, air transport freight, telephone machines and mobile phone subscribers)		Their findings reveal a substantial and relatively great impact of infrastructure on bilateral trade flows. This according to them, was because poor state of infrastructure along the major corridors adds to high cost of transport and as well inhibits trade.
DOMESTIC REGULATORY BARRIERS MEASURE AND TRADE FLOWS							
25	Djankov *et al.*(2006)	126 countries (2001-2003) .	Total exports; GDP ratio; GDPPC ratio; distance ratio; time invariant variables.	A Standard gravity model: A simple difference gravity regression and a difference-in-difference gravity regression	Time Required to exports and imports.		Their study reveal that delaying a products by one-extra day prior to being shipped reduces trade by at least 1 percent. The results further show that agricultural products being a time-sensitive goods has greater effect. They found that time delay by one-extra day tend to reduce country's exports of such products by 6 percent on average.
26	Nordas *et al.*(2006)	192 countries (1996-2004)	Probability to export; GDP; time to exports; corruption.	Gravity model: Maximum Likelihood Heckman regression	Time for exports and time for imports.		Their findings show that probability to export was largely determined by time.
27	Sadikov (2007)	A survey of 345 freight forwarders and port and customs officials across 126 countries in 2005.	Bilateral imports: GDP; GDPPC; tariff; signature required for export, no of procedures to start biz for exports and time invariant variab.	Gravity model: OLS, fixed effect OLS.	Number of procedures to start business; and number of signatures.		The findings indicate that one-extra signature required by exporters prior to shipment reduces aggregate exports by 4.2 percent. Such effect was large and equal to raising importer's tariff by 5 percentage points. The results also show that one-extra signature required tend to reduce differentiated goods exported by 4–5 percent relative to homogeneous goods. And finally, it is shown that only exports of differentiated products are affected by business registration procedures.
28	Iwanow and Kirkpatrick (2009)	124 countries out of which 25 are SSA (2003-2004)	Exports; GDP (X/M); GDPPC (X/M); distance; infrastructure;	A standard gravity model (Panel data): GLS, Heckman procedure.	Required documents, time and cost to export and import	Anderson & van Wincoop (2003)	Their findings reveal that African export performance could certainly be improved through trade facilitation reforms. Also, African export growth could be facilitated through other reforms considered more essential than border reforms. Such reforms include quality of basic

			time invariant variables.				transport and communications infrastructure and improved regulatory environment.
29	Minor and Tsigas (2008)	4 groups of countries: Low-income SSA, All LIC, MIC, and HIC.		CGE model: New GTAP database for the value of time in trade.	Time required to export and import		Their results thereby indicate that lessening the time required to trade across borders considerably impact on GDP of countries involved. Also, it was found that such effort could enable SSA countries having larger exports share of higher value-added products and thus widens intra-regional trade.
30	Bourdet and Persson (2011)	Non-EU Meditarranean countries and EU countries (2006-2009).	Volume of imports: GDP (X/M); GDPPC (X/M); time invariant variables[30]	Panel Gravity model: Fixed effect PPML method.	Time to complete all relevants import procedure and export procedures	New heterogeneous firm trade theory.	The finding reveals that both export volumes and diversification could significantly be expanded through trade facilitation.
31	Bourdet and Persson (2012)	Across EU countries	No of imported products; days; GDP; GDPPC; distance; time invariant variables.	Gravity model: PPML and Fixed effect PPML methods	Time required to complete import processes.		Their results reveal that ability to synchronize import procedures to the current level of most efficient EU countries would encourage an average non-member to expand their aggregate exports by about 20 percent to the EU.
32	Martinez-Zarzoso and M´arquez-Ramos (2008)	A disaggregated trade data for 167 importers and 13 exporters across countries in year 2000	Value of exports; GDP (X/M); tariff; distance; DBI	Gravity model: OLS, PPML and the Harvey model.	Required documents, time and cost to export and import		Their results however indicate that lowering time required to trade and transport costs could boost trade flows. Also, their results show that the WTO multilateral initiatives could bring about potential benefit in terms of trade expansion and that the benefit would cut across country that improves her trade facilitation and in extension to its trading partners.
33	Behar (2009)	A sample of 119 countries across the World	Exports; documents; GDP (X/M); distance; MR	Gravity model: OLS regression and Simulation	Documents required and distance		The estimated results suggest that one more document required reduce exports of an average-size country by 7 percent.
34	Behar *et al.* (2009)	86 exporters, comprises low- and middle-income countries only, and 111 importers	Bilateral exports; GDP (X/M); logistics (X/M); distance; time invariant variables	Gravity model: 2SLS, Probit and simulations	Exporter and importer Logistics	Melitz model	The results indicate that improving logistics by one-standard deviation could enable an average-sized country to expand her exports by about 46 percent.
35	Ueki (2015)	Surveys for SEA countries with large manufacturing	Export propensity; export intensity;	Econometric approach (binary choice model): Binary probit	export customs clearance, average time to directly		The author finds no substantial effect of trade impediments on export intensive enterprises. A comparative analysis also reveals that unfavourable environments suffer by export-intensive enterprises in

[30]Time invariant variables include geographic distance, common colony, common union, membership of Free Trade Agreements and borders.

		activities (Indonesia, the Philippines, and Vietnam), while the 2009 Brazilian survey and four 2010 surveys fromChile, Colombia, Mexico, and Peru.	trade obstacles; input inventory; no of days customs for exports	estimation, OLS method and Heckman's two-step selection model to deal with potential selection bias.	clear custom for export goods, trade obstacles,trade regulations, and input inventory		LA do not encourage integration of such enterprises into global production networks
36	Freund and Rocha (2010)	146 countries in 2007 World Bank Doing Business Survey.	Aggregate exports/aggregate exports by industry; pop; documents; GDP; distance; ports; inland transit and customs.	Augmented Gravity model: OLS and Instrumental variable.	Completing documentation, Inland transit delays, and Customs and ports times		There was significant effect of transit delays on exports. Although, the effect was lower for time-insensitive goods relative to time-sensitive goods. High uncertainty in road transport could also lead to long time through which delivery targets of exporters could be jeopardized. In addition, the results indicate that lessening inland travel times by one-day could improve exports by 7 percent.
INSTITUTIONAL QUALITY BARRIERS MEASURE AND TRADE FLOWS							
37	Anderson and Marcouiller (2000)			Gravity model: tobit model	Transparency and insecurity.		The results show that international trade could significantly be hindered due to transactions costs associated with insecure exchange. In addition, a 10 percent increase in country's transparency and impartiality index bring about 5 percent rise in its import volumes, ceteris paribus.
38	Iwanow (2011)	Bilateral trade among 109 countries (2003-2004).	Manuf. exports: GDP (X/M); institution quality; tariff; time invariant variables.	Standard gravity model: Tobit regression.	Quality of institutions	Anderson and Marcouiller (2003).	It was found that improved institutions could definitely contribute to higher export performance, though institutional importance rises with industry complexity. Also, existence of improved institutional setup could enable countries with such provision to export relatively more in a more complex or contract dependant industries.
39	Helble *et al.* (2007)	APEC economies	GDP (X/M); tariff; NTM; transparency (X/M), documents.	Gravity model: PPML;	Transparency		Their findings reveal that with improvement in transparency as a trade policy measure, there was great potential for trade growth in APEC. Such improvement was estimated to bring about expansion in intra-regional trade among APEC members by 7.5 percent.
40	Abe andWilson (2008)	APEC economies	Import charges/weight of the imports; distance; port congestion (index)	CGE model: GTAP (Global Trade Analysis Project) database version 7database from GTAP, with its base year in 2004	Transparency Improvement and reducing corruption		Their results show that with improved transparency and reduced corruption, APEC members could significantly reap trade and welfare gains attached to such provisions. Further, the analysis suggests that members' efforts towards raising transparency to the level of regional average could expand regional trade by 11 percent while improve global welfare by $406 billion.
41	Bandyopadh	Panel data covering		Econometric approach:	Corruption and poor		Their results indicate that greater corruption bring about higher import

	yay and Roy (2007)	88 countries during 1982-1997 period.		OLS	institutions		duties and other related taxes, and thus reduced the trade GDP ratios of individual countries.
42	Bugel (2010)	Preferential Trade Agreements	Aggregate imports; IQ (X/M); uncertainty level (X/M); distance; ariffs; GDP (X/M) and time invariant variables.	Gravity model: OLS, 2SLS, and PPML.	Institutions (corruption) and uncertainty		The results show that controlling for other institutional measures, uncertainty has significant and negative impact on the intensive margin of trade. The analysis further that in a bilateral trading environment, reducing institutional uncertainty by 10 percent could increase import volumes by 2.4 percent. Also, the intensive margin of trade could rise by 3.8 percent given that the status of institutional quality (that accounts for the degree of uncertainty) improved by 10 percent, ceteris paribus.
43	Bandyopadhya *et al.* (2015)	Across 171 countries during the period 1982-1997		Econometric approach	Corruption		Their findings from the graphs show existence of inverse relationship between corruption and export/import GDP ratios. This signifies that corruption is considered a major hindrance to trade.
OVERALL TRADE COSTS AND TRADE FLOWS							
44	OECD (2003)	102 OECD countries.		CGE model: GTAP database	Trade Transaction Costs (TTSs):Direct costs (constitute costs for supplying information and providing documentation). Indirect costs are associated with procedural delays at border.	Fox et al (2003).	The analysis thereby suggests that each of the transaction costs incuured amount to 1-15 percent of value of traded goods. However, reducing TTCs for traded goods by 1 percent would create gains of $40 billion globally and more gains would be distributed to developing countries.
45	Márquez-Ramos, Martínez-Zarzoso & Suárez-Burguet (2012)	4-digit products with a sample of 167 importers and 13 exporters across countries in year 2000	Value of exports: GDP (X/M); DBI; tariff; time invariant variables	Gravity Model: Bonus vetus OLS	Required documents, time, cost, tariff,and achievements of information technology	Baier and Bergstrand (2009).	Their results indicate that international trade could be promoted to a greater height through significant reduction in the doing business requirements (i.e., documents and time required) and information technology achievement rather than equivalent reductions in tariff barriers.
46	Bernard *et al.*(2006)	4-digit standard industrial classification level (SIC4) with a sample of 337 manufacturing industries.	Average annual % change in industry TFP and Export growth; VTC.	Econometric approach: Logit and OLS techniques	Variable trade costs defined as: (Ad valorem trade costs and ad valorem freight and insurance rates)	Heterogeneous firm trade theory	The results indicate that industries with relatively robust productivity growth are experiencing significant reduction in trade costs. It was also found that with reduction in trade costs, operations of low-productivity plants are likely to stop, while non-exporter with relatively high-productivity were more likely to start exporting in response to trade costs reduction, and finally increase shipments of existing exporters abroad.
47	Jacks *et al.*	18 countries covering	Total exports;	Micro-founded gravity	Tariffs, distance and	Anderson and van	Their findings reveal that with significant rise in tariffs and non-tariff

	(2010)	during the first wave of globalization from 1870 to 1913.	distance; tariffs; infrastructure; ER volatility.	model of trade: Regression analysis.	infrastructure.	Wincoop (2004), Novy (2007)	barriers after 1870, there were no reduction in overall trade costs. Although, it appears to have declined by approximately 10-16 percent, despite reduction in shipping cost and as well removal of exchange rate uncertainty for many trading partners. Finally, policies, proximity, infrastructure, and the British Empire account for over 50 percent differences in trade costs.
48	Lawless (2010)	2006 data with conderation to U.S extensive and intensive margins of trade across 156 countries	Total exports/no of firms/average firm exports; distance; GDP; infrastructure; documents; days; costs	Gravity model: OLS technique	Communication infrastructure, transport costs, required documents,timeand cost (US dollars) to import	Melitz (2003)	The results reveal that U.S exports were affected by trade costs variables through their impact on the extensive margin. Also, regression estimates of the extensive margin have a better fit relative to the intensive margins. Market size and proxies for communications infrastructure were the trade costs variables that had significant negative effects on the intensive margin. However, import cost barriers, language and internal geography all had significant effects on extensive margin.
49	Miroudot *et al.* (2012)	Bilateral trade covering 61 countries using 29 ISICRev.3 sectors together with 12 services sectors(1995-2007).	TFP/TFP growth; transport costs; NTB	Gravity model: OLS technique and Geometric mean of costs	Non-tariff barriers (regulatory burdens) and Transport costs	Anderson and van Wincoop (2003), Novy (2010)	Their findings show that more productive services sectors were faced with lower trade costs and consequently experienced higher productivity growth. Generally, their findings were economically and statistically significant such that reducing trade costs by 10 percent bring about 0.5 percent increase in total factor productivity (TFP).
50	Miroudot *et al.* (2013)	Bilateral trade covering (61 OECD and EU countries) using 29 ISICRev.3 sectors together with 12 services sectors (1995-2007).		Geometric mean of costs	Non-tariff barriers (regulatory burdens) and Transport costs		The findings indicate that costs involved in services trade doubled or tripled those involved in merchandises sectors in some cases. The results further indicate that despite regional grouping to promote a single market in services across EU, there was still a substantial difference in trade costs across countries.
51	De (2007)	4-digit HS data for 2004 across 10 Asian countries	Volume of import; GDP (X/M); weighted tariff; infrastructure; transport costs; FTA dummy; Adjacency dummy; language dummy and remoteness	Augmented Gravity model: OLS and 2SLS estimators.	Trade costs measurement: Infrastructure quality, Tariff and transport costs.	Head (2003), Anderson and van Wincoop (2004).	The results reveal that infrastructure quality, tariffs and transport costs significantly affect patterns of international trade. A 10 percent reduction in transport costs and tariffs would result to bilateral trade expansion by about 6 and 2 percents, respectively.
52	Dennis and Shepherd (2007)	Constructed new measures of export diversification for 118 developing countries	Export diversification; GDP; GDPPC; tariff; entry	Non-parametric models (inferential statistics): Poisson estimator, OLS,	Entry cost, export cost,and tariff		Their findings reveal that reduction of either transport costs or cost to export by 1 percent was associated with 0.4 percent or 0.3 percent gain from export diversification.

		using 8-digit mirror (import) data from the European Union	cost; export cost; real int. rate.	Tobit and negative binomial model			
53	Shepherd (2009)	APEC and ASEAN (1995-2008 and 2001-2007)	Tariff equivalent trade costs; bilateral trade of both countries.	Theory-consistent gravity model: Elasticity approach	Custom procedures, standards and confo rmity assessment, business mobility and electroniccommerce .		The results show that both groups experienced significant reduction in overall trade costs. This was associated with reduction in tariff. However, efforts towards reducing NTBs were limited, thereby suggesting that trade facilitation efforts of both groups should be refocused, particularly on NTBs.
54	Portugal-Perez and Wilson (2008)	115 exporters and 104 importers together with 22 African countries	Volume of exports; GDP; pop; TTRI; OTRI; LPI; documents; days; B_(X/M)	Gravity with a two-stage sample selection model: Two-stage HMR procedure, OLS, Tobit, ET-tobit estimation and PPML estimator.	Border-related costs (tariffs and NTMs), transport costs; behind-the-border issues (governance, transparency, and the business environment); costs of compliance with rules of origin found in PTA.	Helpman, Melitz, and Rubinstein (2008).	Their findings advocate that reducing costs associated with improvements in logistics could enable both less and more advanced African countries in the region to compete favourably in terms of trade growth than a reduction in tariffs.
55	Portugal-Perez and Wilson (2009)	Sub-Saharan African countries	Volume of exports; GDP (X/M); pop (X/M); TTRI; OTRI; LPI (X/M); documents (X/M); days (X/M); DB (X/M)	Gravity model: PPML	OTRI and TTRI, time, costs and documents necessary to export/import and LPI	Heterogeneous firm trade theory	The results suggest that 50 percent improvements in trade logistics to the level in South Africa could yield greater gains for African exporters than a substantive decline in tariff barriers.
56	Brooks and Ferrarini (2010)	Bilateral trade between the People's Republic of China (PRC) and India. (1980-2008)	GDP; and bilateral trade flows	Gravity model: theory founded	Tariff,Infrastructure development and transportation technology		Their findings confirm that ever since 1980s, increasing share of trade growth between the two countries has been ascribed to significant decline in trade costs. Although, less than one third of trade growth during these periods was attributed to trade costs reduction relatively lower than three quarters during the 1990s and almost 85 percent during 2001–2008 period.
57	Hoekman and Nicita (2011)	105 developing countries to include 26 African countries	Volume of trade; GDP (X/M); pop; tariff; DB (X/M) LPI (X/M); distance	A traditional cross-sectiongravity model: Poisson Maximum Likelihood Estimation; while OLS, ZIP,	Tariff, NTM, DB import costs, LPI for importer and exporter (index)		The findings reveal that while tariffs remain a key trade policy barrier in developing countries and for specific sectors (e.g. agriculture) in high-income countries, NTMs and DTCs were also of great importance. The findings further suggest that reducing costs associated with DTCs (captured by TFI: the LPI and the DB) could produce larger trade gains than additional reductions in tariffs, NTMs or seeking for

			and inclusion of time invariant variables	NBREG, PPML and ZINB for robustness checks.			trade preferences.
58	Khan and Kalirajan (2011)	Used two periods data i.e. 1999 and 2004 trade data from Pakistan	Aggregate exports; GDPPC; population; distance; tariff, RER.	Modified Gravity model: Econometric error components methods to estimate stochastic frontier production functions.	Tariff rate, real exchange rate and transport costs.		Their results thus reveal that significant increase in Pakistan's export during these periods was attributed to decline in trade costs arisen from implicit and explicit beyond the border in partner countries.
59	Arvis*et al.*(2013)	178 developing countries for the period 1995-2010.	TC; distance; tariff; RTA; ER; LSCI; LPI, entry costs; colony; common border.	Gravity model: OLS technique.	Average cost of starting a business (entry costs), exchange rate, LPI and Tariff.		Their results show that except during the era of Asian financial crisis, trade costs between India and its Asian trading partners had declined greatly during the period under consideration. Although, significant percent of these costs could not be explained by the highlighted determinants. There are other costs elements arisen from local distribution costs, NTBs and transportation costs among others, which may have a greater impact in determining the trade costs.
60	Gaytaranov *et al*. (2013)	28 transition countries (2005-2011).	Exports volume; GDP; pop; natural resources, distance; RER; FDI; export cost	Gravity model: GMM and GMM-Instrumental variables.	Export cost (documents, custom clearance and technical control, internal transport fees		Their findings indicate that country size and distance had significant impact on exports. Also that greater availability of natural resources impacts positively on exports of these transition countries. The results further reveal insignificant impact of export fees on exports from transition countries but a small negative impact on exports of countries not adjacent to any EU countries.
61	Arvis*et al.* (2015)	167 developing countries for the period 1995-2012.	TC (for manufactured goods); LPI, distance; EC; RER; LSCI; time invariant v.	Gravity model: OLS techniques	Entry costs (average cost of starting a business), LPI, real exchange rate, and Maritime transport Connectivity.		They found that low income and SSA countries were subjected to high trade costs. Therefore, regional integration agreements, trade facilitation performance and maritime transport connectivity were considered as key trade costs determinants.
62	Ezzat (2015)	15 of the Arab countries and Brazil for the period 2006-2013	Value of exports; GDP (X/M); distance; RER; IQ (X/M)[31]; documents; costs (X/M)	Panel Gravity model: pooled, fixed effect or random effect	Transportation costs, documents and cost to export.		The analysis indicate that the performance of the logistical activities worked as a barrier to trade as the sea distance proxied for transport costs had significant and negative elasticity. Also, index for documents to export as costs of regulatory complexity had negative and significant elasticity and the costs of the procedures to export per TEU had significant and negative elasticity.
63	Singh*et al.* (2015)	31 Asian countries	Value of imports;	Gravity model:	Tariffs, non-tariffs, exchange rate and		Their findings confirm that the calculated trade costs and the available proxies had been richly linked with each other in the Asian continent.

[31] IQ means institutional quality.

			GDP(X/M); trade costs	OLS regression and Pooled OLS	port infrastructure		In addition, the signs of coefficients of these proxies were found consistent with the theory. Further, the estimation of gravity clarified that bilateral trade of Asia is highly sensitive to the incurred trade costs. To promote trade in Asia, therefore, the current level of trade costs must be reduced.
64	Singh and Mathur (2014)	India and its 33 trading partners within the Asian Region duringpost liberalization era. (1991 to 2012).	TC; ER; tariffs; infrastructure; distance	Gravity model: (RE model) with the aid of different panel estimation techniques: Hausman test and Breusch-Pagan Lagrange Multiplier (LM) tests	Exchange rate, Tariffs and Infrastructure and distance.		Their results show that except during the era of Asian financial crisis, trade costs between India and its Asian trading partners had declined greatly during the period under consideration. Although, significant percent of these costs could not be explained by the highlighted determinants. There are other costs elements arisen from local distribution costs, NTBs and transportation costs among others, which may have a greater impact in determining the trade costs.
65	Francois and Manchin (2007)	A panel of bilateral trade flows (1988 to 2002).	Exports; GDP (X/M); pop; distance; tariff; infrast (X/M); insti (X/M); time invariant variables.	Selection-based gravity model: probit; tobit.	Institutions, infrastructure; tariff.		Their findings reveal that both export levels and likelihood of exporting were significantly determined by infrastructure efficiency and improved institutional quality.
66	Martinez-Zarzoso *et al.*(2007)	Using sectoral exports from 181 countries to 9 Latin American countries2000-2006	Value of imports; GDP (X/M); GDPPC (X/M); days (X/M); documents (X/M); infrastructure; distance among others TIV.	Gravity model: Panel FE and RE estimators	Maritime transport infrastructure (port container throughput) and trade facilitation procedures (time and documents required to trade)		The findings show that time delays significantly increase freight rates and that natural trade barriers (transport costs) were more important than institutional trade barriers (trade facilitation factors) for Latin American trade.
67	Greenaway*e t al.* (2009)	Export shares of 158 manufacturing industries across 71 countries.(1972 to 1992)	Share of industry *i* in world exports; mkt access; TC measures; H and K[32];	Gravity model: GMM technique.	Quality of countries' infrastructure and institutions.		It was found that trade costs represent country's endowment through which export composition and pattern of comparative advantage were affected. This was reflected in export performance at the industry level. Therefore, countries with reduced trade costs tend to export more of the products which costs were more imperative, having controlled for influences of both physical and human capital endowment on export performance.
68	Duval and Utoktham	A cross sectional dataset of 64 countries	CTC; distance; tariff; internet	Gravity model:	Non-tariff comprehensive	Anderson and van Wincoop (2003)	The analysis show occurrence of high trade costs between India and Mekong countries relative to what prevail among Mekong countries.

[32] H and K are endowments of human and physical capital used in production.

	(2011b)	in 2006.	users; DBI; LSCI.[33]	descriptive statistics and OLS, while PPML for robustness	trade costs (CTC), tariffs, Doing Business Indicators.	and Novy (2009)	Although, between India-Mekong countries, progress were made towards reducing trade costs than with developed countries (for example, Japan and the U.S). This was an indication of significant improvement in regional connectivity. The analyses therefore suggest policies prioritization towards improving maritime and ICT services which are essential for decline in trade costs.
69	Ackah *et al.* (2012)	10 ECOWAS countries during 2007-2009 period.	Bilateral exports; GDP (X/M); tariff; distance; GDPPC (X/M); LPI; other time invariant variable	Gravity model: 2SLS and NBPML.	Tariff; LPI and Infrastructure		Their findings reveal that logistics impact positively on bilateral exports. Also, logistics was found to have larger impact on bilateral exports from members than in the destination countries. In addition, six of the overall LPI indicators were considered key factors determining bilateral exports from and to ECOWAS. Customs efficiency among these indicators had the greatest impact on bilateral trade within ECOWAS. However, logistics competence had the least impact.
70	Adewuyi and Bankole (2012)	Trade agreements between China and Nigeria	BTI[34]; REER; tariff; CGDP; NGDP; Distance (transport cost)	Gravity model: Panel Least Square and Generalised Least Square (GLS cross section weight and variance component)	Tariff, Transport costs and real effective exchange rate.		Their results reveal that mutual tariff reduction by equal magnitude would increase bilateral exports of both countries. In the simulation results, Nigeria would record export growth with a non-reciprocal tariff reduction in China by 25, 50, 75 and 100 percents, respectively in all traded products. Equally, mutual reduction in tariff between them, by equal magnitude would increase Nigeria's exports of mineral fuels, some manufactured products and chemicals by more than 100 percent. On the other hand, China's exports to Nigeria would increase by 32 and 43 percents (for miscellaneous manufactures and crude materials)
71	Thangavelu (2010)	Bilateral trade among75 ASEAN memebrs (2000 - 2001)	Trade flows; GDP; NTB; distance, population, infrastr; time invariant variables	Gravity model	Port efficiency, customs efficiency, regulation environ, service sector infra.		The result show that declines in NTBs significantly have positive effect on ASEAN trade performance.
72	Hoppe*et al.* (2013)	CM-Cross-Border Trade Between Nigeria and Cameroon.	Value of exports; GDP and time invariant variables	Gravity model: Heckman sample selection correction method	Regulatory and security barriers.		Their findings show that regulatory procedures and security barriers at the border and along the road are the major trade barriers. Also, it was that observed Nigeria's non-oil exports value to Cameroon in 2009 was less than 8% of its potential level. So, Cameroon's export value to Nigeria was less than 2% of its potential level.

Source: Author's compilation.

[33] CTC-comprehensive trade costs; LSCI-liner shipping connectivity index

[34] BTI means bilateral trade index. See Adewuyi and Bankole (2012) for detail. CGDP-China's GDP and NGDP-Nigeria's GDP.

Table A-2: Descriptive Analysis for Exports between 2005 and 2016 (Full Period)

Nigeria's Aggregate Exports																		
Variable	agreg3_exp3	agreggdp~x3	agreggdp~m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Obs	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
Mean	3106.71	369.52	2373.05	3.92	103.34	98.26	19.71	62.43	0.12	1.11	-1.25	0.73	7.58	4.85	21.19	11.94	959.00	866.04
Std. D.	5096.60	65.40	3477.63	2.75	10.06	10.32	5.20	33.81	0.01	1.18	0.04	0.86	3.41	3.32	10.17	11.93	448.44	587.87
Min	0.01	260.52	22.30	0.00	88.55	69.16	12.79	4.75	0.11	0.04	-1.32	-1.47	0.00	0.00	5.46	0.04	250.00	0.00
Max	34758.30	464.28	16597.45	14.03	119.94	128.24	32.68	167.48	0.14	6.16	-1.15	1.90	10.00	13.00	41.00	63.00	1560.00	2410.00
CV	164.05	17.70	146.55	70.10	9.73	10.50	26.40	54.15	8.38	105.52	-3.42	117.70	44.96	68.38	48.01	99.87	46.76	67.88
Nigeria's Agriculture Sector Exports																		
Variable	agric3_exp3	aggdp3_x3	aggdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	163.86	87.70	74.63	2.43	103.34	98.26	19.71	62.43	0.12	1.11	-1.25	0.73	7.58	4.85	21.19	11.94	959.00	866.04
Std. D.	382.72	14.69	139.99	3.10	10.06	10.32	5.20	33.81	0.01	1.18	0.04	0.86	3.41	3.32	10.17	11.93	448.44	587.87
Min	0.00	63.34	0.08	0.00	88.55	69.16	12.79	4.75	0.11	0.04	-1.32	-1.47	0.00	0.00	5.46	0.04	250.00	0.00
Max	3618.26	110.50	733.67	15.03	119.94	128.24	32.68	167.48	0.14	6.16	-1.15	1.90	10.00	13.00	41.00	63.00	1560.00	2410.00
CV	233.56	16.75	187.58	127.53	9.73	10.50	26.40	54.15	8.38	105.52	-3.42	117.70	44.96	68.38	48.01	99.87	46.76	67.88
Nigeria's Manufacturing Exports																		
Variable	manuf3_exp3	mangdp3_x3	mangdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	110.70	28.93	391.36	3.47	103.34	98.26	19.71	62.43	0.12	1.11	-1.25	0.73	7.58	4.85	21.19	11.94	959.00	866.04
Std. D.	214.76	10.41	609.23	3.09	10.06	10.32	5.20	33.81	0.01	1.18	0.04	0.86	3.41	3.32	10.17	11.93	448.44	587.87
Min	0.00	15.72	1.87	0.00	88.55	69.16	12.79	4.75	0.11	0.04	-1.32	-1.47	0.00	0.00	5.46	0.04	250.00	0.00
Max	1997.48	44.47	2856.98	12.80	119.94	128.24	32.68	167.48	0.14	6.16	-1.15	1.90	10.00	13.00	41.00	63.00	1560.00	2410.00
CV	194.00	35.99	155.67	89.06	9.73	10.50	26.40	54.15	8.38	105.52	-3.42	117.70	44.96	68.38	48.01	99.87	46.76	67.88
Nigeria's Extractive Sector Exports																		
Variable	extract3_exp3	extragdp3_x3	extragdp3_m3	trf	reer_x	reer_m	mat_x	mat_m	rot_x2	rot_m2	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	cos_x2	cos_m2
Mean	2906.24	66.76	233.73	2.43	103.34	98.26	19.71	62.43	0.12	1.11	-1.25	0.73	7.58	4.85	21.19	11.94	959.00	866.04
Std. D.	5088.29	3.80	319.22	3.10	10.06	10.32	5.20	33.81	0.01	1.18	0.04	0.86	3.41	3.32	10.17	11.93	448.44	587.87
Min	0.00	57.33	0.72	0.00	88.55	69.16	12.79	4.75	0.11	0.04	-1.32	-1.47	0.00	0.00	5.46	0.04	250.00	0.00
Max	34384.05	71.66	1579.92	15.03	119.94	128.24	32.68	167.48	0.14	6.16	-1.15	1.90	10.00	13.00	41.00	63.00	1560.00	2410.00
CV	175.08	5.69	136.58	127.53	9.73	10.50	26.40	54.15	8.38	105.52	-3.42	117.70	44.96	68.38	48.01	99.87	46.76	67.88

Source: Author's computation.

Note: Std. D. represents standard deviation while CV is coefficient of variation.

Table A-3:Descriptive Analysis for Imports between 2005 and 2016 (Full period)

Nigeria's Aggregate Imports																		
Variable	agreg3_imp3	agreggdp~m3	agreggdp~x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Obs	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
Mean	1393.40	369.52	2373.05	9.97	103.34	98.26	19.71	62.43	0.12	1.11	-1.25	0.73	11.17	3.95	33.38	10.03	1198.55	764.07
Std. D.	1993.55	65.40	3477.63	0.83	10.06	10.32	5.20	33.81	0.01	1.18	0.04	0.86	5.12	2.49	15.81	7.86	429.40	509.86
Min	6.39	260.52	22.30	8.33	88.55	69.16	12.79	4.75	0.11	0.04	-1.32	-1.47	0.00	0.00	7.21	0.04	564.00	0.00
Max	13701.24	464.28	16597.45	11.36	119.94	128.24	32.68	167.48	0.14	6.16	-1.15	1.90	17.00	9.00	53.00	47.00	1960.00	2410.00
CV	143.07	17.70	146.55	8.31	9.73	10.50	26.40	54.15	8.38	105.52	-3.42	117.70	45.88	62.99	47.36	78.32	35.83	66.73
Nigeria's Agriculture Sector Imports																		
Variable	agric3_imp3	aggdp3_m3	aggdp3_x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	227.09	87.70	74.63	10.73	103.34	98.26	19.71	62.43	0.12	1.11	-1.25	0.73	11.17	3.95	33.38	10.03	1198.55	764.07
Std. D.	414.27	14.69	139.99	1.53	10.06	10.32	5.20	33.81	0.01	1.18	0.04	0.86	5.12	2.49	15.81	7.86	429.40	509.86
Min	0.01	63.34	0.08	8.40	88.55	69.16	12.79	4.75	0.11	0.04	-1.32	-1.47	0.00	0.00	7.21	0.04	564.00	0.00
Max	3346.58	110.50	733.67	13.07	119.94	128.24	32.68	167.48	0.14	6.16	-1.15	1.90	17.00	9.00	53.00	47.00	1960.00	2410.00
CV	182.42	16.75	187.58	14.28	9.73	10.50	26.40	54.15	8.38	105.52	-3.42	117.70	45.88	62.99	47.36	78.32	35.83	66.73
Nigeria's Manufacturing Imports																		
Variable	manuf3_imp3	mangdp3_m3	mangdp3_x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	1033.54	28.93	391.36	10.07	103.34	98.26	19.71	62.43	0.12	1.11	-1.25	0.73	11.17	3.95	33.38	10.03	1198.55	764.07
Std. D.	1723.03	10.41	609.23	1.64	10.06	10.32	5.20	33.81	0.01	1.18	0.04	0.86	5.12	2.49	15.81	7.86	429.40	509.86
Min	1.47	15.72	1.87	7.52	88.55	69.16	12.79	4.75	0.11	0.04	-1.32	-1.47	0.00	0.00	7.21	0.04	564.00	0.00
Max	13418.61	44.47	2856.98	13.27	119.94	128.24	32.68	167.48	0.14	6.16	-1.15	1.90	17.00	9.00	53.00	47.00	1960.00	2410.00
CV	166.71	35.99	155.67	16.27	9.73	10.50	26.40	54.15	8.38	105.52	-3.42	117.70	45.88	62.99	47.36	78.32	35.83	66.73
Nigeria's Extractive Sector Imports																		
Variable	extract3_imp3	extragdp3_m3	extragdp3_x3	trf	reer_m	reer_x	mat_m	mat_x	rot_m2	rot_x2	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	cos_m2	cos_x2
Mean	133.02	66.76	233.73	10.73	103.34	98.26	19.71	62.43	0.12	1.11	-1.25	0.73	11.17	3.95	33.38	10.03	1198.55	764.07
Std. D.	397.07	3.80	319.22	1.53	10.06	10.32	5.20	33.81	0.01	1.18	0.04	0.86	5.12	2.49	15.81	7.86	429.40	509.86
Min	0.00	57.33	0.72	8.40	88.55	69.16	12.79	4.75	0.11	0.04	-1.32	-1.47	0.00	0.00	7.21	0.04	564.00	0.00
Max	3559.99	71.66	1579.92	13.07	119.94	128.24	32.68	167.48	0.14	6.16	-1.15	1.90	17.00	9.00	53.00	47.00	1960.00	2410.00
CV	298.50	5.69	136.58	14.28	9.73	10.50	26.40	54.15	8.38	105.52	-3.42	117.70	45.88	62.99	47.36	78.32	35.83	66.73

Source: Author's Computation.

Note: Std. Dev. denotes standard deviation and CV is coefficient of variation.

Table A-4: Results of Correlation Analysis among Explanatory Variables (Sectoral Exports models)

Agricultural Sector Exports Model																	
	laggdp_x	laggdp_m	trf	reer_x	reer_m	mat_x	mat_m	rot_x	rot_m	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	lcos_x2	lcos_m2
laggdp_x	1.000																
laggdp_m	0.029	1.000															
trf	0.049	0.132	1.000														
reer_x	0.873	0.025	0.037	1.000													
reer_m	-0.124	-0.152	-0.257	-0.112	1.000												
mat_x	0.847	0.027	0.047	0.777	-0.142	1.000											
mat_m	0.170	0.143	-0.465	0.146	0.330	0.150	1.000										
rot_x	-0.994	-0.029	-0.056	-0.875	0.140	-0.855	-0.171	1.000									
rot_m	0.025	0.003	-0.287	0.019	0.019	0.020	-0.176	-0.023	1.000								
inq_x	-0.072	0.003	-0.008	-0.179	-0.037	0.164	-0.004	0.036	-0.014	1.000							
inq_m	0.011	-0.418	-0.564	0.016	0.219	0.009	0.266	-0.011	0.426	-0.008	1.000						
ndr_x2	-0.622	-0.019	-0.076	-0.437	0.191	-0.678	-0.124	0.676	-0.005	-0.366	-0.002	1.000					
ndr_m2	-0.405	0.119	0.354	-0.293	-0.019	-0.425	-0.439	0.432	-0.251	-0.195	-0.584	0.572	1.000				
ndp_x2	-0.854	-0.027	-0.051	-0.787	0.152	-0.770	-0.150	0.879	-0.013	0.044	-0.009	0.731	0.444	1.000			
ndp_m2	-0.429	0.113	0.495	-0.389	-0.085	-0.402	-0.395	0.450	-0.259	-0.010	-0.637	0.409	0.655	0.494	1.000		
lcos_x2	-0.516	-0.016	-0.072	-0.511	0.187	-0.545	-0.106	0.586	-0.002	-0.035	-0.003	0.743	0.424	0.783	0.463	1.000	
lcos_m2	-0.431	0.095	-0.020	-0.425	0.074	-0.462	-0.282	0.489	0.108	-0.005	-0.076	0.654	0.439	0.670	0.502	0.820	1.000
Manufacturing Sector Exports Model																	
	lmangdp_x	lmangdp_m	trf	reer_x	reer_m	mat_x	mat_m	rot_x	rot_m	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	lcos_x2	lcos_m2
lmangdp_x	1.000																
lmangdp_m	0.039	1.000															
trf	-0.041	-0.381	1.000														
reer_x	0.936	0.038	-0.039	1.000													
reer_m	-0.136	0.038	-0.220	-0.112	1.000												
mat_x	0.848	0.032	-0.041	0.777	-0.142	1.000											
mat_m	0.167	0.626	-0.408	0.146	0.330	0.150	1.000										
rot_x	-0.981	-0.039	0.045	-0.875	0.140	-0.855	-0.171	1.000									
rot_m	0.023	0.090	-0.274	0.019	0.019	0.020	-0.176	-0.023	1.000								
inq_x	-0.139	-0.002	-0.016	-0.179	-0.037	0.164	-0.004	0.036	-0.014	1.000							
inq_m	0.013	0.202	-0.766	0.016	0.219	0.009	0.266	-0.011	0.426	-0.008	1.000						
ndr_x2	-0.592	-0.027	0.012	-0.437	0.191	-0.678	-0.124	0.676	-0.005	-0.366	-0.002	1.000					
ndr_m2	-0.385	-0.328	0.538	-0.293	-0.019	-0.425	-0.439	0.432	-0.251	-0.195	-0.584	0.572	1.000				
ndp_x2	-0.856	-0.037	0.034	-0.787	0.152	-0.770	-0.150	0.879	-0.013	0.044	-0.009	0.731	0.444	1.000			
ndp_m2	-0.440	-0.391	0.646	-0.389	-0.085	-0.402	-0.395	0.450	-0.259	-0.010	-0.637	0.409	0.655	0.494	1.000		
lcos_x2	-0.586	-0.024	0.0002	-0.511	0.187	-0.545	-0.106	0.586	-0.002	-0.035	-0.003	0.743	0.424	0.783	0.463	1.000	
lcos_m2	-0.485	-0.119	0.129	-0.425	0.074	-0.462	-0.282	0.489	0.108	-0.005	-0.076	0.654	0.439	0.670	0.502	0.820	1.000

Table A-4 (Continued): Extractive sector Exports model

	lextragdp_x	lextragdp_m	trf	reer_x	reer_m	mat_x	mat_m	rot_x	rot_m	inq_x	inq_m	ndr_x2	ndr_m2	ndp_x2	ndp_m2	lcos_x2	lcos_m2
lextragdp_x	1.000																
lextragdp_m	-0.032	1.000															
trf	-0.043	-0.372	1.000														
reer_x	-0.330	0.045	0.037	1.000													
reer_m	0.126	0.049	-0.257	-0.112	1.000												
mat_x	-0.348	0.044	0.047	0.777	-0.142	1.000											
mat_m	-0.089	0.483	-0.465	0.146	0.330	0.150	1.000										
rot_x	0.549	-0.052	-0.056	-0.875	0.140	-0.854	-0.171	1.000									
rot_m	0.002	0.073	-0.287	0.019	0.019	0.020	-0.176	-0.023	1.000								
inq_x	-0.422	0.001	-0.008	-0.179	-0.036	0.164	-0.004	0.036	-0.014	1.000							
inq_m	0.002	0.204	-0.564	0.016	0.218	0.009	0.266	-0.011	0.426	-0.008	1.000						
ndr_x2	0.687	-0.037	-0.076	-0.437	0.191	-0.678	-0.124	0.676	-0.005	-0.366	-0.002	1.000					
ndr_m2	0.399	-0.325	0.354	-0.293	-0.019	-0.425	-0.439	0.432	-0.251	-0.195	-0.584	0.572	1.000				
ndp_x2	0.615	-0.048	-0.051	-0.787	0.152	-0.770	0.150	0.879	-0.013	0.044	-0.009	0.731	0.444	1.000			
ndp_m2	0.317	-0.407	0.495	-0.389	-0.085	-0.402	-0.395	0.450	-0.259	0.010	-0.637	0.409	0.655	0.493	1.000		
lcos_x2	0.496	-0.031	-0.072	-0.511	0.186	-0.545	-0.106	0.586	-0.002	-0.035	-0.003	0.743	0.424	0.783	0.463	1.000	
lcos_m2	0.417	-0.122	-0.020	-0.425	0.074	-0.462	-0.282	0.489	0.108	-0.005	-0.076	0.654	0.439	0.670	0.502	0.820	1.000

Table A-5: Results of Correlation Analysis among Explanatory Variables (Sectoral Imports models)

AgriculturalSector Imports Model																	
	laggdp_m	laggdp_x	trf	reer_m	reer_x	mat_m	mat_x	rot_m	rot_x	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	lcos_m2	lcos_x2
laggdp_m	1.000																
laggdp_x	0.029	1.000															
trf	-0.704	-0.023	1.000														
reer_m	0.873	0.025	-0.481	1.000													
reer_x	-0.124	-0.152	0.072	-0.112	1.000												
mat_m	0.847	0.027	-0.777	0.777	-0.142	1.000											
mat_x	0.170	0.143	-0.119	0.146	0.330	0.150	1.000										
rot_m	-0.994	-0.029	0.677	-0.875	0.140	-0.855	-0.171	1.000									
rot_x	0.025	0.003	-0.020	0.019	0.019	0.020	-0.176	-0.023	1.000								
inq_m	-0.072	0.003	-0.406	-0.179	-0.036	0.164	-0.004	0.036	-0.014	1.000							
inq_x	0.011	-0.418	-0.003	0.016	0.219	0.009	0.266	-0.011	0.426	-0.008	1.000						
ndr_m2	-0.672	-0.021	0.562	-0.482	0.183	-0.707	-0.129	0.720	-0.006	-0.339	-0.003	1.000					
ndr_x2	-0.457	0.181	0.379	-0.327	0.007	-0.496	-0.236	0.496	-0.239	-0.257	-0.550	0.703	1.000				
ndp_m2	-0.859	-0.026	0.474	-0.811	0.175	-0.796	-0.155	0.897	-0.014	0.032	-0.009	0.784	0.552	1.000			
ndp_x2	-0.546	0.153	0.271	-0.514	-0.015	-0.519	-0.303	0.577	-0.198	0.001	-0.535	0.546	0.746	0.682	1.000		
lcos_m2	-0.338	-0.012	-0.013	-0.310	0.148	-0.376	-0.073	0.399	0.005	-0.049	0.001	0.667	0.466	0.728	0.559	1.000	
lcos_x2	-0.426	0.073	0.100	-0.426	0.106	-0.443	-0.274	0.482	-0.012	-0.017	-0.181	0.590	0.528	0.709	0.643	0.744	1.000
Manufacturing Sector Imports Model																	
	lmangdp_m	lmangdp_x	trf	reer_m	reer_x	mat_m	mat_x	rot_m	rot_x	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	lcos_m2	lcos_x2
lmangdp_m	1.000																
lmangdp_x	0.039	1.000															
trf	0.250	0.016	1.000														
reer_m	0.936	0.038	0.174	1.000													
reer_x	-0.136	0.038	0.034	-0.112	1.000												
mat_m	0.848	0.032	-0.031	0.777	-0.142	1.000											
mat_x	0.167	0.626	0.045	0.146	0.330	0.150	1.000										
rot_m	-0.981	-0.039	-0.305	-0.875	0.140	-0.855	-0.171	1.000									
rot_x	0.023	0.090	0.007	0.019	0.019	0.020	-0.176	-0.023	1.000								
inq_m	-0.139	-0.002	-0.166	-0.179	-0.036	0.164	-0.004	0.036	-0.014	1.000							
inq_x	0.013	0.202	0.002	0.016	0.219	0.009	0.266	-0.011	0.426	-0.008	1.000						
ndr_m2	-0.632	-0.029	-0.073	-0.482	0.183	-0.707	-0.129	0.720	-0.006	-0.339	-0.003	1.000					
ndr_x2	-0.439	0.192	-0.001	-0.327	0.007	-0.496	-0.236	0.496	-0.239	-0.257	-0.550	0.703	1.000				
ndp_m2	-0.889	-0.036	-0.178	-0.811	0.175	-0.796	-0.155	0.897	-0.014	0.032	-0.009	0.784	0.552	1.000			
ndp_x2	-0.569	-0.221	-0.121	-0.514	-0.015	-0.519	-0.303	0.577	-0.198	0.001	-0.535	0.546	0.746	0.682	1.000		
lcos_m2	-0.369	-0.019	-0.098	-0.310	0.148	-0.376	-0.073	0.399	0.005	-0.049	0.001	0.667	0.466	0.728	0.559	1.000	
lcos_x2	-0.480	-0.083	-0.024	-0.426	0.106	-0.443	-0.274	0.482	-0.012	-0.017	-0.181	0.590	0.528	0.709	0.643	0.744	1.000

Table A-5 (Continued): Extractive sector Imports model

	lextragdp_m	lextragdp_x	trf	reer_m	reer_x	mat_m	mat_x	rot_m	rot_x	inq_m	inq_x	ndr_m2	ndr_x2	ndp_m2	ndp_x2	lcos_m2	lcos_x2
lextragdp_m	1.000																
lextragdp_x	-0.032	1.000															
trf	0.443	-0.036	1.000														
reer_m	-0.330	0.045	-0.481	1.000													
reer_x	0.126	0.049	0.072	-0.112	1.000												
mat_m	-0.348	0.044	-0.776	0.777	-0.142	1.000											
mat_x	-0.089	0.483	-0.119	0.146	0.330	0.150	1.000										
rot_m	0.549	-0.052	0.677	-0.875	0.140	-0.855	-0.171	1.000									
rot_x	0.002	0.073	-0.020	0.019	0.019	0.020	-0.176	-0.023	1.000								
inq_m	-0.422	0.001	-0.406	-0.179	-0.036	0.164	-0.004	0.036	-0.014	1.000							
inq_x	0.002	0.204	-0.003	0.016	0.219	0.009	0.266	-0.011	0.426	-0.008	1.000						
ndr_m2	0.711	-0.040	0.562	-0.482	0.183	-0.707	-0.129	0.720	-0.006	-0.339	-0.003	1.000					
ndr_x2	0.486	-0.217	0.379	-0.327	0.007	-0.496	-0.236	0.496	-0.239	-0.257	-0.550	0.703	1.000				
ndp_m2	0.595	-0.047	0.474	-0.811	0.175	-0.796	-0.155	0.897	-0.014	0.032	-0.009	0.784	0.552	1.000			
ndp_x2	0.411	-0.252	0.271	-0.514	-0.015	-0.518	-0.303	0.577	-0.198	0.001	-0.535	0.546	0.746	0.682	1.000		
lcos_m2	0.457	-0.024	-0.013	-0.310	0.148	-0.376	-0.073	0.399	0.005	-0.049	0.001	0.667	0.466	0.728	0.559	1.000	
lcos_x2	0.425	-0.098	0.100	-0.426	0.106	-0.443	-0.274	0.482	-0.012	-0.017	-0.181	0.590	0.528	0.709	0.643	0.744	1.000

Table A-6: Codes used for Descriptive Analysis

Aggregate Exports

su aggreg3_exp3 aggreggdp3_x3 aggreggdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2

su aggreg3_exp3 aggreggdp3_x3 aggreggdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2 if year <=2013

su aggreg3_exp3 aggreggdp3_x3 aggreggdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2 if year >2013

Agricultural Sector Exports

su agric3_exp3 aggdp3_x3 aggdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2

su agric3_exp3 aggdp3_x3 aggdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2 if year <=2013

su agric3_exp3 aggdp3_x3 aggdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2 if year >2013

Manufacturing Sector Exports

su manuf3_exp3 mangdp3_x3 mangdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2

su manuf3_exp3 mangdp3_x3 mangdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2 if year <=2013

su manuf3_exp3 mangdp3_x3 mangdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2 if year >2013

Extractive Sector Exports

su extract3_exp3extragdp3_x3 extragdp3_m3trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2

su extract3_exp3extragdp3_x3 extragdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2 if year <=2013

su extract3_exp3extragdp3_x3 extragdp3_m3 trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 cos_x2 cos_m2 if year >2013

Aggregate Imports

su aggreg3_imp3 aggreggdp3_m3 aggreggdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2

su aggreg3_imp3 aggreggdp3_m3 aggreggdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2 if year <=2013

su aggreg3_imp3 aggreggdp3_m3 aggreggdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2 if year >2013

Agricultural Sector Imports

su agric3_imp3 aggdp3_m3 aggdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2

su agric3_imp3 aggdp3_m3 aggdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2 if year <=2013

su agric3_imp3 aggdp3_m3 aggdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2 if year >2013

Manufacturing Sector Imports

su manuf3_imp3 mangdp3_m3 mangdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2

su manuf3_imp3 mangdp3_m3 mangdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2 if year <=2013

su manuf3_imp3 mangdp3_m3 mangdp3_x3 trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2 if year >2013

Extractive Sector Imports

su extract3_imp3 extragdp3_m3 extragdp3_x3trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2

su extract3_imp3 extragdp3_m3 extragdp3_x3trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2 if year <=2013

su extract3_imp3 extragdp3_m3 extragdp3_x3trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 cos_m2 cos_x2 if year >2013

Table A-7: Codes used for Correlation Analysis

Correlation Analysis for Exports Models

pwcorr laggreg2_exp2 laggreggdp_x laggreggdp_m trf reer_x reer_m mat_x mat_m rot_x rot_m inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 lcos_x2 lcos_m2, sig
pwcorr lagric2_exp2 laggdp_x laggdp_m trf reer_x reer_m mat_x mat_m rot_x rot_m inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 lcos_x2 lcos_m2, sig
pwcorr lmanuf2_exp2 lmangdp_x lmangdp_m trf reer_x reer_m mat_x mat_m rot_x rot_m inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 lcos_x2 lcos_m2, sig
pwcorrextract2_exp2lextragdp_x lextragdp_m trf reer_x reer_m mat_x mat_m rot_x rot_m inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 lcos_x2 lcos_m2, sig

Correlation Analysis for Imports Models

pwcorr laggreg2_imp2 laggreggdp_m laggreggdp_x trf reer_m reer_x mat_m mat_x rot_m rot_x inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 lcos_m2 lcos_x2, sig
pwcorr lagric2_imp2 laggdp_m laggdp_x trf reer_m reer_x mat_m mat_x rot_m rot_x inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 lcos_m2 lcos_x2, sig
pwcorr lmanuf2_imp2 lmangdp_m lmangdp_x trf reer_m reer_x mat_m mat_x rot_m rot_x inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 lcos_m2 lcos_x2, sig
pwcorr extract2_imp2 lextragdp_m lextragdp_x trf reer_m reer_x mat_m mat_x rot_m rot_x inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 lcos_m2 lcos_x2, sig

Codes for OLS Residual and Durbin-Wu test

Exports Model

reg laggreg2_exp2 laggreggdp_x laggreggdp_m trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 lcos_x lcos_m
predict residual
pwcorr fulaggr_resid laggreggdp_x laggreggdp_m trf reer_x reer_m mat_x mat_m rot_x2 rot_m2 inq_x inq_m ndr_x2 ndr_m2 ndp_x2 ndp_m2 lcos_x2 lcos_m2

Imports Model

reg laggreg2_imp2 laggreggdp_m laggreggdp_x trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 lcos_m lcos_x
predict residual
pwcorr fulaggimp_resid laggreggdp_m laggreggdp_x trf reer_m reer_x mat_m mat_x rot_m2 rot_x2 inq_m inq_x ndr_m2 ndr_x2 ndp_m2 ndp_x2 lcos_m lcos_x

Table A-8: Codes used for Empirical Analysis

AGGREGATE EXPORTS (FULL PERIOD)

```
ivregress 2sls laggreg_exp reer_m reer_x trf ndp_x2 ndp_m2 rot_x2 rot_m2 inq_x inq_m mat_x cos_x2 cos_m2 laggrgdp_m (laggrgdp_x mat_m = l_laggrgdp_m l_trf l_inq_m l2_ndr_m l2_mat_m l_cos_x2)
overid
xtivreg laggreg_exp reer_m reer_x trf ndp_x2 ndp_m2 rot_x2 rot_m2 inq_x inq_m mat_x cos_x2 cos_m2 laggrgdp_m (laggrgdp_x mat_m = l2_ndr_x l_laggrgdp_m l_mat_m l_cos_m2), fe
est store fe
xtivreg laggreg_exp reer_m reer_x trf ndp_x2 ndp_m2 rot_x2 rot_m2 inq_x inq_m mat_x cos_x2 cos_m2 laggrgdp_m (laggrgdp_x mat_m = l2_ndr_x l_laggrgdp_m l_mat_m l_cos_m2), re
est store re
hausman fe re

ivregress 2sls laggreg_exp reer_m reer_x trf ndr_x2 ndr_m2 rot_x2 rot_m2 inq_x inq_m mat_x cos_x2 cos_m2 laggrgdp_m (laggrgdp_x mat_m = l_laggrgdp_x l_mat_m l_cos_x2)
xtivreg laggreg_exp reer_m reer_x trf ndr_x2 ndr_m2 rot_x2 rot_m2 inq_x inq_m mat_x cos_x2 cos_m2 laggrgdp_m (laggrgdp_x mat_m = l_ndr_x2 l_inq_x l_laggrgdp_m l_mat_m l_cos_x2), fe
xtivreg laggreg_exp reer_m reer_x trf ndr_x2 ndr_m2 rot_x2 rot_m2 inq_x inq_m mat_x cos_x2 cos_m2 laggrgdp_m (laggrgdp_x mat_m = l_ndr_x2 l_inq_x l_laggrgdp_m l_mat_m l_cos_x2), re
hausman fe re
```

SUB PERIOD

```
ivregress 2sls laggreg_exp reer_m reer_x trf ndp_m2 ndp_x2 rot_m2 inq_x inq_m mat_x lcos_x2 lcos_m2 laggrgdp_m (laggrgdp_x mat_m = l_ndr_x2 l_inq_m l_mat_m) if year <=2013
xtivreg laggreg_exp reer_m reer_x trf ndp_m2 ndp_x2 rot_m2 inq_x inq_m mat_x lcos_x2 lcos_m2 laggrgdp_m (laggrgdp_x mat_m = l_ndr_x2 l_inq_m l_mat_m) if year <=2013, fe
xtivreg laggreg_exp reer_m reer_x trf ndp_m2 ndp_x2 rot_m2 inq_x inq_m mat_x lcos_x2 lcos_m2 laggrgdp_m (laggrgdp_x mat_m = l_ndr_x2 l_inq_m l_mat_m) if year <=2013, re
ivregress 2sls laggreg_exp reer_m reer_x trf ndr_m2 rot_m2 rot_x2 inq_x inq_m mat_x lcos_x2 lcos_m2 laggrgdp_m (laggrgdp_x mat_m = l_laggrgdp_x l_ndr_m2 l_mat_m) if year <=2013
xtivreg laggreg_exp reer_m reer_x trf ndr_m2 rot_m2 rot_x2 inq_x inq_m mat_x lcos_x2 lcos_m2 laggrgdp_m (laggrgdp_x mat_m = l_ndr_x2 l_inq_x l_mat_m) if year <=2013, fe
xtivreg laggreg_exp reer_m reer_x trf ndr_m2 rot_m2 rot_x2 inq_x inq_m mat_x lcos_x2 lcos_m2 laggrgdp_m (laggrgdp_x mat_m = l_ndr_x2 l_inq_x l_mat_m) if year <=2013, re
```

AGRICULTURAL SECTOR EXPORTS (FULL PERIOD)

```
ivregress 2sls lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndp_m2 ndp_x2 mat_x mat_m cos_m2 (cos_x2 reer_m = l_trf l_reer_m l_cos_x2)
xtivreg lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndp_m2 ndp_x2 mat_x mat_m cos_m2 (cos_x2 reer_m = l_mat_m l_reer_m l_cos_m l_lcos_x), fe
xtivreg lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndp_m2 ndp_x2 mat_x mat_m cos_m2 (cos_x2 reer_m = l_mat_m l_reer_m l_cos_m l_lcos_x), re
ivregress 2sls lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndr_m2 ndr_x2 mat_x mat_m cos_m2 (cos_x2 reer_m = l_mat_x l_trf l_reer_m l_lcos_x)
xtivreg lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndr_m2 ndr_x2 mat_x mat_m cos_m2 (cos_x2 reer_m = l_mat_x l_reer_m cos_m2 l_lcos_x), fe
xtivreg lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndr_m2 ndr_x2 mat_x mat_m cos_m2 (cos_x2 reer_m = l_mat_x l_reer_m cos_m2 l_lcos_x), re
```

SUB PERIOD

```
ivregress 2sls lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 inq_x inq_m ndp_m2 ndp_x2 mat_x mat_m lcos_m2 (lcos_x2 reer_m = l_lcos_x2 l_reer_m l_mat_m) if year <=2013
xtivreg lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 inq_x inq_m ndp_m2 ndp_x2 mat_x mat_m lcos_m2 (lcos_x2 reer_m = l_cos_x l_reer_m l_mat_m) if year <=2013, fe
xtivreg lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 inq_x inq_m ndp_m2 ndp_x2 mat_x mat_m lcos_m2 (lcos_x2 reer_m = l_cos_x l_reer_m l_mat_m) if year <=2013, re
ivregress 2sls lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndr_m2 mat_x mat_m lcos_m2 (lcos_x2 reer_m = l_ndr_m l_reer_m l_lcos_m2 l_lcos_x2) if year <=2013
xtivreg lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndr_m2 mat_x mat_m lcos_m2
```

(lcos_x2 reer_m = l_trf l_inq_x l_reer_m l_lcos_m2 l_lcos_x2) if year <=2013, fe
xtivreg lagric_exp laggdp_m laggdp_x trf reer_x rot_m2 rot_x2 inq_x inq_m ndr_m2 mat_x mat_m lcos_m2 (lcos_x2 reer_m = l_trf l_inq_x l_reer_m l_lcos_m2 l_lcos_x2) if year <=2013, re

MANUFACTURING SECTOR EXPORTS (FULL PERIOD)

ivregress 2sls lmanuf_exp lmangdp_m trf rot_x2 rot_m2 inq_m inq_x cos_m2 ndp_m2 ndp_x2 reer_x reer_m mat_m mat_x (lmangdp_x cos_x2 = l_rot_x2 l_inq_x l_inq_m l_lmangdp_m)
xtivreg lmanuf_exp lmangdp_m trf rot_x2 rot_m2 inq_m inq_x cos_m2 ndp_m2 ndp_x2 reer_x reer_m mat_m mat_x (lmangdp_x cos_x2 = l_rot_x2 l_inq_x l_lmangdp_x l_cos_x2), fe
xtivreg lmanuf_exp lmangdp_m trf rot_x2 rot_m2 inq_m inq_x cos_m2 ndp_m2 ndp_x2 reer_x reer_m mat_m mat_x (lmangdp_x cos_x2 = l_rot_x2 l_inq_x l_lmangdp_x l_cos_x2), re
ivregress 2sls lmanuf_exp lmangdp_m trf rot_m2 rot_x2 inq_m inq_x cos_m2 ndr_m2 ndr_x2 reer_x reer_m mat_m mat_x (lmangdp_x cos_x2 = l_reer_x ndp_x l_lmangdp_x l_cos_m2)
xtivreg lmanuf_exp lmangdp_m trf rot_m2 rot_x2 inq_m inq_x cos_m2 ndr_m2 ndr_x2 reer_x reer_m mat_m mat_x (lmangdp_x cos_x2 = l_mangdp_x l_lmangdp_m l_cos_x2), fe
xtivreg lmanuf_exp lmangdp_m trf rot_m2 rot_x2 inq_m inq_x cos_m2 ndr_m2 ndr_x2 reer_x reer_m mat_m mat_x (lmangdp_x cos_x2 = l_mangdp_x l_lmangdp_m l_cos_x2), re

SUB PERIOD

ivregress 2sls lmanuf_exp lmangdp_m trf rot_m2 inq_m inq_x lcos_m2 ndp_m2 ndp_x2 reer_x reer_m mat_m mat_x (lmangdp_x lcos_x2 = l_ndp_m2 l_ndp_x2 l_lmangdp_m) if year <=2013
xtivreg lmanuf_exp lmangdp_m trf rot_m2 inq_m inq_x lcos_m2 ndp_m2 ndp_x2 reer_x reer_m mat_m mat_x (lmangdp_x lcos_x2 = l_rot_x2 l_lmangdp_m l_lmangdp_x l_cos_m2) if year <=2013, fe
xtivreg lmanuf_exp lmangdp_m trf rot_m2 inq_m inq_x lcos_m2 ndp_m2 ndp_x2 reer_x reer_m mat_m mat_x (lmangdp_x lcos_x2 = l_rot_x2 l_lmangdp_m l_lmangdp_x l_cos_m2) if year <=2013, re
ivregress 2sls lmanuf_exp lmangdp_m trf rot_m2 rot_x2 inq_m inq_x lcos_m2 ndr_m2 reer_x reer_m mat_m mat_x (lmangdp_x lcos_x2 = l_rot_x2 l_inq_m l_lmangdp_m) if year <=2013
xtivreg lmanuf_exp lmangdp_m trf rot_m2 rot_x2 inq_m inq_x lcos_m2 ndr_m2 reer_x reer_m mat_m mat_x (lmangdp_x lcos_x2 = l_rot_x2 l_lmangdp_x l_cos_x2) if year <=2013, fe
xtivreg lmanuf_exp lmangdp_m trf rot_m2 rot_x2 inq_m inq_x lcos_m2 ndr_m2 reer_x reer_m mat_m mat_x (lmangdp_x lcos_x2 = l_rot_x2 l_lmangdp_x l_cos_x2) if year <=2013, re

EXTRACTIVE SECTOR EXPORTS (FULL PERIOD)

poisson extract_exp lextragdp_x lextragdp_m trf cos_x2 cos_m2 mat_x mat_m inq_x inq_m reer_x reer_m rot_x2 rot_m2 ndp_x2 ndp_m2
xtpoisson extract_exp lextragdp_x lextragdp_m trf cos_x2 cos_m2 mat_x mat_m inq_x inq_m reer_x reer_m rot_x2 rot_m2 ndp_x2 ndp_m2, fe
poisson extract_exp lextragdp_x lextragdp_m trf cos_x2 cos_m2 mat_x mat_m inq_x inq_m reer_x reer_m rot_x2 rot_m2 ndr_x2 ndr_m2
xtpoisson extract_exp lextragdp_x lextragdp_m trf cos_x2 cos_m2 mat_x mat_m inq_x inq_m reer_x reer_m rot_x2 rot_m2 ndr_x2 ndr_m2, fe

SUB PERIOD

poisson extract_exp lextragdp_x lextragdp_m trf lcos_x2 lcos_m2 mat_x mat_m inq_x inq_m reer_x reer_m rot_x2 rot_m2 ndp_x2 ndp_m2 if year <=2013
xtpoisson extract_exp lextragdp_x lextragdp_m trf lcos_x2 lcos_m2 mat_x mat_m inq_x inq_m reer_x reer_m rot_x2 rot_m2 ndp_x2 ndp_m2 if year <=2013, fe
poisson extract_exp lextragdp_x lextragdp_m trf lcos_x2 lcos_m2 mat_x mat_m inq_x inq_m reer_x reer_m rot_x2 rot_m2 ndr_x2 ndr_m2 if year <=2013
xtpoisson extract_exp lextragdp_x lextragdp_m trf lcos_x2 lcos_m2 mat_x mat_m inq_x inq_m reer_x reer_m rot_x2 rot_m2 ndr_x2 ndr_m2 if year <=2013, fe

AGGREGATE IMPORT (FULL PERIOD)

ivregress 2sls laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2 cos_x2 ndp_x2 ndp_m2 (cos_m2 = l_ndp_m l_cos_m2)
xtivreg laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2 cos_x2 ndp_x2 ndp_m2 (cos_m2 = l_ndp_m l_cos_m2), fe
xtivreg laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2 cos_x2 ndp_x2 ndp_m2 (cos_m2 = l_ndp_m l_cos_m2), re
ivregress 2sls laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2

cos_x2 ndr_x2 ndr_m2 (cos_m2 = l_trf l_cos_x2)
xtivreg laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2 cos_x2 ndr_x2 ndr_m2 (cos_m2 = l_ndp_x2 l_ndp_m2 l_cos_x2), fe
xtivreg laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2 cos_x2 ndr_x2 ndr_m2 (cos_m2 = l_ndp_x2 l_ndp_m2 l_cos_x2), re

SUB PERIOD

ivregress 2sls laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 lcos_x2 ndp_x2 ndp_m2 (lcos_m2 = ndr_m2 ndr_x2) if year <=2013
xtivreg laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 lcos_x2 ndp_x2 ndp_m2 (lcos_m2 = ndr_m2 ndr_x2) if year <=2013, fe
xtivreg laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 lcos_x2 ndp_x2 ndp_m2 (lcos_m2 = ndr_m2 ndr_x2) if year <=2013, re
ivregress 2sls laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2 lcos_x2 ndr_x2 (lcos_m2 = ndp_m2 lmat_x) if year <=2013
xtivreg laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2 lcos_x2 ndr_x2 (lcos_m2 = ndp_m2 cos_m2) if year <=2013, fe
xtivreg laggreg_imp laggreggdp_x laggreggdp_m mat_x mat_m trf reer_m reer_x inq_x inq_m rot_x2 rot_m2 lcos_x2 ndr_x2 (lcos_m2 = ndp_m2 cos_m2) if year <=2013, re

AGRICULTURALSECTOR IMPORTS (FULL PERIOD)

ivregress 2sls lagric_imp laggdp_x ndp_x2 ndp_m2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf cos_m2 (laggdp_m cos_x2 = l_mat_x l_laggdp_m l_laggdp_x l_lcos_x)
xtivreg lagric_imp laggdp_x ndp_x2 ndp_m2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf cos_m2 (laggdp_m cos_x2 = l_mat_x l_laggdp_m l_laggdp_x l_lcos_x), fe
xtivreg lagric_imp laggdp_x ndp_x2 ndp_m2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf cos_m2 (laggdp_m cos_x2 = l_mat_x l_laggdp_m l_laggdp_x l_lcos_x),re
ivregress 2sls lagric_imp laggdp_x ndr_x2 ndr_m2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf cos_m2 (laggdp_m cos_x2 = l_laggdp_m l_laggdp_x l_cos_x)
xtivreg lagric_imp laggdp_x ndr_x2 ndr_m2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf cos_m2 (laggdp_m cos_x2 = l_laggdp_m l_laggdp_x l_cos_x), fe
xtivreg lagric_imp laggdp_x ndr_x2 ndr_m2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf cos_m2 (laggdp_m cos_x2 = l_laggdp_m l_laggdp_x l_cos_x), re

SUB PERIOD

ivregress 2sls lagric_imp laggdp_x ndp_x2 ndp_m2 reer_x reer_m rot_x2 inq_x inq_m mat_x mat_m trf lcos_m2 (laggdp_m lcos_x2 = l_ndp_x2 l_laggdp_x l_lcos_x2) if year <=2013
xtivreg lagric_imp laggdp_x ndp_x2 ndp_m2 reer_x reer_m rot_x2 inq_x inq_m mat_x mat_m trf lcos_m2 (laggdp_m lcos_x2 = l_laggdp_m l_lcos_x2) if year <=2013, fe
xtivreg lagric_imp laggdp_x ndp_x2 ndp_m2 reer_x reer_m rot_x2 inq_x inq_m mat_x mat_m trf lcos_m2 (laggdp_m lcos_x2 = l_laggdp_m l_lcos_x2) if year <=2013, re
ivregress 2sls lagric_imp laggdp_x ndr_x2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf lcos_m2 (laggdp_m lcos_x2 = l_ndr_x2 l_laggdp_x l_lcos_x2) if year <=2013
xtivreg lagric_imp laggdp_x ndr_x2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf lcos_m2 (laggdp_m lcos_x2 = l_laggdp_m l_lcos_x2) if year <=2013, fe
xtivreg lagric_imp laggdp_x ndr_x2 reer_x reer_m rot_m2 rot_x2 inq_x inq_m mat_x mat_m trf lcos_m2 (laggdp_m lcos_x2 = l_laggdp_m l_lcos_x2) if year <=2013, re

MANUFACTURING SECTOR IMPORTS (FULL PERIOD)

ivregress 2sls lmanuf_imp trf mat_x mat_m ndp_x2 ndp_m2 inq_x inq_m rot_x2 rot_m2 cos_x2 cos_m2 lmangdp_x reer_x (lmangdp_m reer_m = lmat_x lndr_x l_reer_x l2_reer_m l_lmangdp_x)
xtivreg lmanuf_imp trf mat_x mat_m ndp_x2 ndp_m2 inq_x inq_m rot_x2 rot_m2 cos_x2 cos_m2 lmangdp_x reer_x (lmangdp_m reer_m = lmat_x lndr_x l_reer_x l2_reer_m l_lmangdp_x), fe
xtivreg lmanuf_imp trf mat_x mat_m ndp_x2 ndp_m2 inq_x inq_m rot_x2 rot_m2 cos_x2 cos_m2 lmangdp_x reer_x (lmangdp_m reer_m = lmat_x lndr_x l_reer_x l2_reer_m l_lmangdp_x), re
ivregress 2sls lmanuf_imp trf mat_x mat_m ndr_x2 ndr_m2 inq_x inq_m rot_x2 rot_m2 cos_x2 cos_m2 lmangdp_x reer_x (lmangdp_m reer_m = l_ndp_x l_reer_x l2_reer_m l_lmangdp_x)
xtivreg lmanuf_imp trf mat_x mat_m ndr_x2 ndr_m2 inq_x inq_m rot_x2 rot_m2 cos_x2 cos_m2 lmangdp_x reer_x (lmangdp_m reer_m = l_ndp_x l_reer_x l2_reer_m l_lmangdp_x), fe
xtivreg lmanuf_imp trf mat_x mat_m ndr_x2 ndr_m2 inq_x inq_m rot_x2 rot_m2 cos_x2 cos_m2 lmangdp_x reer_x

(lmangdp_m reer_m = l_ndp_x l_reer_x l2_reer_m l_lmangdp_x), re

SUB PERIOD

ivregress 2sls lmanuf_imp trf mat_x mat_m ndp_x2 ndp_m2 inq_x inq_m rot_x2 lcos_x2 lcos_m2 lmangdp_x reer_x (lmangdp_m reer_m = l_inq_x l_rot_x2 l_lmangdp_x) if year <=2013

xtivreg lmanuf_imp trf mat_x mat_m ndp_x2 ndp_m2 inq_x inq_m rot_x2 lcos_x2 lcos_m2 lmangdp_x reer_x (lmangdp_m reer_m = l_inq_x l_mat_m l_lmangdp_x) if year <=2013, fe

xtivreg lmanuf_imp trf mat_x mat_m ndp_x2 ndp_m2 inq_x inq_m rot_x2 lcos_x2 lcos_m2 lmangdp_x reer_x (lmangdp_m reer_m = l_inq_x l_mat_m l_lmangdp_x) if year <=2013, re

ivregress 2sls lmanuf_imp trf mat_x mat_m ndr_x2 inq_x inq_m rot_x2 rot_m2 lcos_x2 lcos_m2 lmangdp_x reer_x (lmangdp_m reer_m = l_inq_x l_rot_x2 l_lmangdp_x) if year <=2013

xtivreg lmanuf_imp trf mat_x mat_m ndr_x2 inq_x inq_m rot_x2 rot_m2 lcos_x2 lcos_m2 lmangdp_x reer_x (lmangdp_m reer_m = l_inq_x cos_x2 lreer_m l_lmangdp_x) if year <=2013, fe

xtivreg lmanuf_imp trf mat_x mat_m ndr_x2 inq_x inq_m rot_x2 rot_m2 lcos_x2 lcos_m2 lmangdp_x reer_x (lmangdp_m reer_m = l_inq_x cos_x2 lreer_m l_lmangdp_x) if year <=2013, re

EXTRACTIVE SECTOR IMPORTS (FULL PERIOD)

poisson extract_imp lextragdp_m lextragdp_x trf cos_m2 cos_x2 mat_m mat_x inq_m inq_x reer_m reer_x rot_m2 rot_x2 ndp_m2 ndp_x2

xtpoisson extract_imp lextragdp_m lextragdp_x trf cos_m2 cos_x2 mat_m mat_x inq_m inq_x reer_m reer_x rot_m2 rot_x2 ndp_m2 ndp_x2, fe

poisson extract_imp lextragdp_m lextragdp_x trf cos_m2 cos_x2 mat_m mat_x inq_m inq_x reer_m reer_x rot_m2 rot_x2 ndr_m2 ndr_x2

xtpoisson extract_imp lextragdp_m lextragdp_x trf cos_m2 cos_x2 mat_m mat_x inq_m inq_x reer_m reer_x rot_m2 rot_x2 ndr_m2 ndr_x2, fe

SUB PERIOD

poisson extract_imp lextragdp_m lextragdp_x trf lcos_m2 lcos_x2 mat_m mat_x inq_m inq_x reer_m reer_x rot_m2 rot_x2 ndp_m2 ndp_x2 if year <=2013

xtpoisson extract_imp lextragdp_m lextragdp_x trf lcos_m2 lcos_x2 mat_m mat_x inq_m inq_x reer_m reer_x rot_m2 rot_x2 ndp_m2 ndp_x2 if year <=2013, fe

poisson extract_imp lextragdp_m lextragdp_x trf lcos_m2 lcos_x2 mat_m mat_x inq_m inq_x reer_m reer_x rot_m2 rot_x2 ndr_m2 ndr_x2 if year <=2013

xtpoisson extract_imp lextragdp_m lextragdp_x trf lcos_m2 lcos_x2 mat_m mat_x inq_m inq_x reer_m reer_x rot_m2 rot_x2 ndr_x2 if year <=2013, fe