

Investigating Dutch Disease: The Case of Nigeria

Taiwo Alphonso Oyesanmi

Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of the requirements for the Degree of

Master of Science
in
Economics

Eastern Mediterranean University

June 2011

Gazimağusa, North Cyprus

Approval of the Institute of Graduate Studies and Research

Prof. Dr. Elvan Yılmaz
Director

I certify that this thesis satisfies the requirements as a thesis for the degree of Master of Science in Economics.

Prof. Dr. Mehmet Balcilar
Chair, Department of Economics

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Master of Science in Economics

Assoc. Prof. Dr. Cem Payasioglu
Supervisor

Examining Committee

-
1. Assoc. Prof. Dr. Cagay Coskuner
 2. Assoc. Prof. Dr. Cem Payasioglu
 3. Assoc. Prof. Dr. Eralp Bektas

ABSTRACT

This research study empirically investigates the presence of Dutch disease hypothesis in Nigeria when there is long run equilibrium, focusing on this concept of long run equilibrium between crude oil export and agricultural output covering the period 1970-2009 by using Johansen cointegration test, Vector Error Correction Model type of VAR, Impulse Response Function and Variance Decomposition while investigating this possible long run relationship then the study concentrated on two objectives. First main objective is to detect if there exist a negative relationship between crude oil export and agricultural output when crude oil export and the variables are normalized on agricultural output and the second aspect is to observe how innovations or shocks to the crude oil export explains the variations or changes in Agricultural output. In this study seven variables were used namely LAGR, LGDP, LXQcrudeoil, LREER, SRRATE, LRRATE, INFL to explain the Dutch Disease Hypothesis while transformation of variable to log help sort out the scaling problems with variables expressed in the above stated forms. The results are:

(1) Cointegration among the variables using (Trace and maximum Eigen values) Johansen tests found cointegration of order (1) which means the variables move together in the long run and when normalized on LAGR, LXQcrudeoil has the expected sign and significant in explaining the expected relationship.

(2) After finding cointegration, we proceed to Vector Error Correction (VEC), when LAGR is normalized on other variables, LXQcrudeoil has the same expected negative sign and it is significant in explaining the relationship.

(3) Using Impulse Response Function, innovation in LXQcrudeoil is significant in explaining the negative changes in LAGR as expected.

(4) Using Variance Decomposition, LXQcrudeoil explains about 20% variations in LAGR when shocks were applied. The findings show that, “Dutch Disease” hypothesis exist in Nigeria and cannot be ignored in Nigeria using these economic variables.

Keywords: Dutch disease, impulse response function, variance decomposition, cointegration, Nigeria, maximum eigen value, hypothesis.

ÖZ

Bu arařtırmada Nijerya’da ‘‘Hollanda hastalığının’’ (Dutch Disease) mevcudiyetinin uzun dönem denge kořulları altında incelenmesi ampirik olarak yapılmaktadır. Ülkenin 1970-2009 dönemleri verileri kullanılarak ham petrol ihracatı ve tarımsal üretim arasındaki bir uzun dönem dengesinin varlığı ve bununla bağlantılı sınamalar Johansen Eřtümleşme testi, Yöney Hata Düzeltme Modeli (VECM) ,Etki tepki İşlevi ve Deęişirlik Ayırıştırması metodları kullanılarak arařtırılmıştır. Çalışmada uzun dönem ilişkisi arařtırılırken iki amaç gözetilmiştir. Birincisi ve çalışmanın ana teması deęişkenlerin tarımsal üretime göre normalleştirildiğinde ham petrol ihracatı ile tarımsal üretim arasında ters yönde bir bağlantının sınanmasıdır. İkinci amaç ise ham petrol şoklarının veya yenileşimlerinin tarımsal üretimdeki deęişmeleri nasıl etkilediğini arařtırmaktır.Bu çalışmada LAGR, LGDP, LXCruideOil, LREER, SRRATE, LRRATE,INFL başlıklı yedi adet deęişken kullanılmıştır. Sırasıyla tarımsal üretim,Gayri safi yurt içi hasıla, ham petrol ihracatı, reel efektif döviz kuru, kısa ve uzun vadeli faiz oranları olarak belirlenen deęişkenlerin ilk dördü veri ölçeklemesini sağlamak için logaritmik olarak ifade edilmişlerdir.

1) İz ve Özdeęer sınamaları sonucunda deęişkenler arasında bir adet eřtümleşme vektörü tesbit edilmiş olup, dolayısıyla bu deęişkenlerin uzun dönemde birlikte hareket ettikleri gözlemlenmektedir. LAGR deęişkenine göre normalleştirme yapıldığında ham petrol ihracatı (LXQcrudeoil) ile aralarında oluşan ilişkinin yönü beklendiği gibi çıkmıştır.2) Eřtümleşme sınamasını müteakip Yöney Hata Düzeltme Modeli (VECM) tahmini yapılmıştır. Bu aşamada da LXQcrudeoil deęişkeninin

katsayısının beklenen negatif işarete sahip olduğu ve istatistiksel olarak anlamlı olduğu görülmüştür. 3) Etki tepki işlevi yöntemine göre LXQcrudeoil değişkeninde oluşan yenileşimin, beklenildiği gibi LAGR değişkeninde oluşan negatif değişimleri açıklamada anlamlı bulunduğu gözlemlenmiştir. 4) Değişirlik ayrıştırması uygulamasında LXQcrudeoil LAGR değişkenindeki değişimin yaklaşık %20'sini açıklayabildiği tesbit edilmiştir. Bütün bu bulgular Nijerya'da bir "Hollanda hastalığı" etkeninin varlığına işaret etmekte ve bu ekonomik değişkenler kullanıldığında sorununun gözardı edilemeyeceğini göstermektedir.

Anahtar Kelimeler:Hollanda Hastalığı, Etki Tepki İşlevi, Değişirlik Ayrıştırması, Eştümleşme Testi, Nijerya, Maksimum Özdeğer, Hipotez.

ACKNOWLEDGMENTS

I would like to express my profound gratitude to my thesis supervisor Assoc. Prof Dr Cem Payasioglu and also to all my lecturers who had contributed immensely to my academic excellence for without your support and encouragements this work would have never been accomplished am forever grateful to my supervisor for his enormous supervision, tutoring and directional guidance during this research, it was enormously beneficial to engrafting my knowledge.

I am greatly indebted to my friends and colleagues for their confidence in me and support not only during my research but also during my stay on campus.

Special thanks goes to the Almighty God and my family for their love, understanding and warm support at all times, am forever appreciative.

TABLE OF CONTENTS

ABSTRACT	iii
ÖZ.....	v
ACKNOWLEDGMENTS.....	vii
LIST OF TABLES	x
LIST OF FIGURES.....	xi
LIST OF ABBREVIATIONS	xii
1 INTRODUCTION.....	1
1.1 Introduction	1
1.2 Overview of the Nigerian Economy	5
1.3 Impact of the Oil Industry to the Nigeria Economy	9
1.4 Aim of the study	12
2 REVIEW OF RELATED LITERATURE	14
2.1 An Overview.....	14
3 DATA AND METHODOLOGY	20
3.1 Introduction	20
3.2 Methodology.....	21
3.2.1 VAR (Vector Autoregression).....	22
3.2.2 Cointegration.....	23
3.2.3 Testing for Cointegration.....	24
3.2.4 The Vector Error Correction Model (VECM)	25
3.2.5 Impulse Response Function (IRF)	27
3.2.6 Variance Decomposition.....	28

3.2.7 Model Specification	28
3.2.8 Johansen’s Approach/Methodology of Cointegration	29
3.2.9 Vector Error Correction Model (VECM)	29
3.2.10 Impulse Response Function	30
3.2.11 Variance Decomposition.....	30
3.3 The Data Collection and Analysis	31
4 ANALYSIS OF THE MODEL AND EMPIRICAL RESULTS	33
4.1 Introduction	33
4.2 Cointegration	34
4.3 Vector Error Correction Model	36
5 CONCLUSIONS AND POLICY RECOMMENDATION	42
5.1 Conclusion	42
5.2 Policy Recommendations	44
REFERENCES.....	49
APPENDIX.....	54

LIST OF TABLES

Table 4.2.1 Unrestricted Cointegrated Rank Test (Maximum Eigenvalue).....	33
Table 4.2.2 Unrestricted Cointegrated Rank Test (Trace Test).....	33
Table 4.2.3 Johansen's Cointegration among variables.....	35
Table 4.3.1 Vector Error Correction among the variable	37
Table 4.3.2 Variance Decomposition	40

LIST OF FIGURES

Figure 4.3.1 Impulse Response Function between LAGR and few variables from (1970-2009).....	38
Figures 4.3.2 Variance Decomposition between LAGR and other variables from (1970-2009).....	39

LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
ADRL	Autoregressive Distributed Lag
B	Booming
BP	British Petroleum
CBN	Central Bank of Nigeria
CE	Cointegration
DCs	Developed Countries
DD	Dutch Disease
FSO	Federal Statistics Office
GDP	Gross Domestic Product
GNP	Gross National Product
IFS	International Financial Statistics
IMF	International Monetary Fund
INFL	Inflation
IRF	Impulse Response Function
L	Lagging
LAGR	Log(AGR)
LDCs	Less Developed Countries
LGDP	Log(GDP)
LNG	Liquefied Natural Gas
LR	Long Run

LREER Log(REER)
LRRATE Long Run Rate
LXQCRUDEOIL Log(XQCRUDEOIL)
NGN Nigerian Naira
NI National Income
NNOC Nigeria National Oil Company
NNPC Nigeria National Petroleum Corporation
OLS Ordinary Least Squares
OPEC Oil Producing Exporting Countries
PP Philips Perron
PPP Purchasing Power Parity
RER Real Exchange Rate
SAP Structural Adjustment Programme
SR Short Run
UN United Nations
USD United States Dollar
VAR Vector Autoregression
VECM Vector Error Correction Model
VMA Vector Moving Average
WTS World Trading Statistics
XQ Export Quantity

Chapter 1

INTRODUCTION

1.1 Introduction

Nigeria is known for her vast black populace, unarguably the largest in the world today she lies between Cameroon and bordered by Chad Republic, (Benin republic), (Niger republic), the gulf of guinea on the Atlantic ocean, all from East, West, North and the south respectively, she is in the western part of Africa, her population currently stands at over 150million people as of today, having had her colonized by Great Britain. Nigeria is blessed with over 89 natural resources as documented as of today, with lush agricultural landscape, her initial source of economic sustenance was through agricultural output exports namely cash crops such as Cocoa, Timber, Cashew, Kolanut, Palm oil, Palm Kernel, Rubber and Groundnut, which aided her economic growth and development. [(olusi and olagunju 2005)] records that Crude oil exploration and exploitation by foreign firms especially Royal Dutch Shell BP initiated marketable export sales in large quantities from the wetland Niger-Delta area in the mid-1950s from Oloibiri now in the present Bayelsa state and old Bendel state (mid-west region), thereby heralding the advent of international sale of crude oil in the late 1950s, also confirmed by the world bank reports. The outbreak of clashes between the federal government troops and the Biafra republic now defunct (eastern

part of Nigeria) between (1967 to 1970) paralyzed activities in this sector, nevertheless it was to later emerge as the source of catalyst of economic boom for the country after the war ended in 1970. Major economic analysts who studied the Nigeria oil sector recalled that the impact of this new sector was not felt until the mid-1970s where it became a major means of foreign exchange earnings and contributed to the National Income (NI) and Gross National Product (GNP). The crisis in the middle-east in the mid-1970s led to a hike in price of crude oil, therefore increasing the national revenue while we enjoyed this oil boom the cash crop agricultural sector began to diminish to the lowest level.

Before 1970's the nation's competitive edge was in her cash crop production (LAGR) which portrayed an important source of livelihood for the nation, since the advent of crude oil this sector has accounted for over 90% of our source of foreign exchange revenue. Even though Agriculture was responsible for the highest employment of our labour force the World Bank report corroborate this fact. According to World Bank (1975) in the 1960's , Nigeria was listed as a exporter of major cash crops in the world, while exporting over three hundred thousand tonnes of her cash crops, as supported by central bank of Nigeria statistical bulletin.

Progressively, Nigeria began to steer away from agriculture to crude oil sector exploitation, but before the 1970's we had a primary agricultural produce sector that was very strong which was our main exports and ever since then this has earned the reputation of being our total gainer in our exports until crude oil was found, this led

to current state of doldrum in which agriculture has been underutilized due to high dollar denominated proceeds from crude oil as cited by [(olusi and olagungu,2005)]. Progressively, it was quite obvious in Nigeria our crude oil was thriving with Nigeria extracting and producing over two million barrels of crude oil daily, the initial agricultural sector was dwindling due to the progress made in this newly found oil industry.

According to Gylfasson, many nations that are blessed with natural resources have shown great imbalance in their macroeconomics performance over the years than other nations which are natural resources abundant. In Nigeria currently the per capita income using Gross National Product (GNP) as index is almost the same as it was fifty years ago. Over a period of thirty years starting from 1965 through 1998, oil prosperous nations had an average per capital GNP growth ranging from [(-1%,-2%,-3% and -6%)] respectively for countries like [(Iran and Venezuela, Libya, Iraq and Kuwait, Qatar)] who are members of OPEC [(World Bank, 2000)]. For Oil producing exporting countries in general, GNP per capital reduction was monitored, there was a slash of 1.3% averagely per year in comparism to 2.2% per capita growth on average considering these regions.

“Nigeria had a growth rate of 1.45% in her per capita GDP in the first 30years of her existence which compares unfavorably with estimates reported by emerging market economies in Asia, such as [(China, Hong-Kong, Singapore, Taiwan, and South Korea)], each having 5.1%, 6.7%, 6.1% and 6.8% respectively in their per capital GDP, in sub-Saharan Africa, Botswana witnessed a steady development in growth

rate of real GDP per capital assumed as 8% in mid to late 1980s as emphasized by” (Iyoha (200b; 2).

With the crude oil exploration growing rapidly and the agricultural sector dwindling geometrically, we have indications of the “DUTCH DISEASE”, since the Nigerian economic system was built on crude oil base in the early 1970’s, then we began to experience the “Dutch Disease” syndrome. (Sachs J: 1995) affirmatively asserted that the resource-rich countries would witness slow growth in comparison to poorer countries when economic indicators such as initial per-capital income and trade policies are considered. The “Dutch Disease” (DD) refers to a situation where reversal of positive effects or negative effects of natural resources booms on countries hamper their economic transformation where they are extracted. This theory conceptually emanated from the “Netherlands” now Holland in the 1960’s period as a result of the exploitation and tapping of the newly found gas reserves positioned in the “north sea”, revenues denominated in hard currencies was earned and the domestic Dutch gilder began to appreciate in value sharply, hurting non-oil sector like “agriculture and manufacturing” and their exports dwindled in the world markets, with an overall negative effect on the whole economy, leaving oil or hydrocarbons to dominate the economy. The objective of my thesis research is to test or examine the symptoms of Dutch Disease in Nigeria if it exist or not while the agricultural sector (LAGR) depicts the initial “resourceful” sector opposing earlier researches that assumed the manufacturing segment of the nation as the diminishing “resourceful” sector for Nigeria and other third world countries or (LDCS).

1.2 Overview of the Nigerian Economy

The Nigerian economy has since experienced numerous political and economic distortions since she got independence in 1960. Nigeria is known for her vast crude oil and gas reserves making her a regular member of the (OPEC), with this immense wealth at her disposal, Nigeria as a nation should be able to sustain her infrastructural capacity and economic enhancement. Economic activities were stagnant for a long period as a result of poor economic policy, low institutional qualities and bad leadership by the military administration for over thirty years or more. The country was indebted and had led to 30% of her international revenue from crude oil sales been used for servicing the interest accruable from the foreign debt of \$33 billion (USD), which greatly stifled the growth of the country during this period, even though the Obasanjo-led government in year (1999-2007) paid off this external debts. According to “[Henry Bienen (1988)] this indicated that Nigeria’s economic upheaval and turbulence could jeopardize the overall well being of the economy, this invariably led the country in 1986 to adopt the Structural Adjustment Programme (SAP) so as to contend with the impact of the debt crisis, while channeling a long run solution economically so as to attain the standard of the global financial aid organization who could aid debt relief called the International Monetary Fund (IMF)]’.

Nigeria’s strength is in no doubt a food basket in Africa, having sustained this food production segment for ages which is driven by subsistence, cash crop and cattle rearing farming as an edge for the survival of the nation, currently Nigeria ranks

among major food-importing economy due to negligence in the “agricultural tradable sector”. The (SAP) was implemented on the basis of IMF expertise advice after critically evaluating national projects and proffering it as an antidote to the manifestation of (DD). “Dutch Disease can be defined as a case of huge monetary influx due to accumulated funds from a major sale of major natural resource export at the global market, this impact will crowd out numerous aspect of the economy, leaving behind wreckages in employment and inflicting have burden on the system if not properly managed as there will be imbalances to contend with such as joblessness, crime, increase in price levels and trade deficit, where all these features are prevalent in the Nigerian economy”.

The effects on the economy which was purportedly linked to bad domestic macroeconomic policies were worsened by internationally transmitted shocks on crude oil prices in the 1980’s, this event pushed the overall economy into serious economic comatose and led the government to implement the SAP to remedy the situation. The government in 1975 shared the excess crude oil accurate profit through the “Udoji lead panel” of high jumbo pay package to civil servants, called the popular “Udoji Awards”, to show the extent of the crude oil windfall.

In recent times, “studies show that Nigeria’s per capital GNP was measured, it was \$120 (USD) in 1964 while it was \$780 (USD) in 1981, and then it was \$280(USD) in 1997, currently GNP per capital in Nigeria in year 2010 is \$288.37(USD) per person. Thus, between 1964 and 1981, income per capita elevated to 32.3% while from (1981 to 1997), it decreased by an annual average of 4%. However, if income per capita had

continued to increase beyond 1981 as it did before it started to fall, Nigerian's GNP per capita would have equaled \$1,279(USD) in 1997. The difference between per capita GNP in 2010, \$288(USD) and \$1,279(USD), which is approximately \$990(USD), is a rough measure of the cost of Dutch Disease, due to macroeconomic policy mistakes and adverse international economic shocks like the fall in crude oil price experienced in the 1980's to an average Nigerian''.

Although Nigeria experienced an increase in its crude oil export sector, this increase which ought to generate economic growth did not last neither did it impact any significant effect in changing the economic prosperity and structure of the economy. "By all standard this means that the Nigerian economy has experienced growth without development especially when resources and riches may displace and diminish the agricultural and manufacturing sector, a symptom of the Dutch Disease''.

Summarily, her trade openness had risen significantly in the 1990's; the ratio of trade to GDP has average to 80.1%. The Central Bank of Nigeria (CBN) estimated the GDP at year 2005 to be at \$112billion (USD),while the IMF projects her inflation rate to the 7.7% Nigeria's GDP at current prices, for year 2011 was forecasted by IMF to be at \$37189.68 billion, fuel export (% of merchandise exports) at year 2008 is 91.74%. According to tradingeconomics.com, "Nigeria is a nation with as high as 95% earner of her foreign proceeds from oil sales which also stand for about 80% of her revenues while mostly her populace are agriculture dependent in means of livelihood as peasants, where most people live under a \$1 per day as statistics confirm due to government incompetence, maladministration, corrupt tendencies which cripple development''. The average inflation was estimated at 12.36% in 2009

according to IMF, Nigerian's share of economy in the world's total GDP, measuring it by purchasing power parity (PPP), was 0.48%, while it is forecasted that by 2015 that her inflation average and share of world total GDP will be 8.50% and 0.53% respectively. According to (Sanusi L: 2011) as quoted in The Nation's Newsprint saying that, "Nigeria's foreign reserves account was reducing drastically to as low as \$33.2 billion(USD) owing to acute food shortage, where the government intervention in staple food importation was highly necessary, while the ease of cash liquidity to major parts of agriculture, small medium enterprises (SMEs) and manufacturing sector as quite crucial to maintain forecasted 8.29% growth rate in GDP for 2011".

The problem of over reliance on primary products such as the sole exporting of crude oil remains a serious problem despite various attempts to find a solution to it. Attempts to diversifying the economy and the "tradable" oil export sector had been futile, even with exploration of the liquefied natural gas (LNG) an important source of export revenue, both oil and gas are closely linked hydrocarbon, with unsatisfactory result in re-vitalizing the economy of Nigeria.

After many years of operation, the economy remain stagnant, steady and sustainable growth still seem unrealistic, this means that serious efforts in unraveling the root cause of this economic impasse must be put in place, without ruling out the presence of Dutch Disease in the country and other (un)observable causes, while putting in place necessary designs, solutions and implementation of suitable masses friendly programmes

1.3 Impact of the Oil Industry to the Nigeria Economy

Since the initiation of oil exploration and exploitation in Nigeria from 1956 till date, this industry after the 1970s had achieved the position of the heartbeat of the economy, providing high annual revenue to our national government, with fuel exports at 91.74% as at year 2008 and provides 80% of budget revenues, employment of youths, boosting local expenditure on goods and services, increasing our GDP, gigantically expanding our foreign revenue earnings and ensuring the adequacy of needed resources to our industrial and commercial sectors.

Major impact of this segment to the Nigerian economy cannot be under emphasized despite the constraints on the overall welfare of the economy. Progressively, the segment of the economy began to employ Nigerians into their technical sectors from the non-technical sectors, after proper skills acquisition and training exercise, as well as into supervisory and managerial capacities.

The core stakeholders' contributors in the oil sectors to GNP are measured by its (gross outputs minus the cost of inputs namely heavy earth moving machines, material resources, and services) imported from overseas. The total output in the crude oil sector = [(revenues from oil exports abroad + local sales of crude oil for local refining + local and foreign sales of liquefied natural gas)].

Another important contribution was the initiation of the joint venture called “Nigeria National Petroleum Corporation” (NNPC) which is state-owned which provides fuel

to industrial facilities, commercial enterprises and individuals with operations that cover the extended spectrum of the Nigerian Petroleum industry. The NNPC is bequeathed with the responsibilities of joint ventures with multinational oil companies, it has an extensive brief tasks of production, distribution, and marketing, besides training workers, managing oil leases, encouraging indigenous participation, ensuring uniform pricing in local markets and exploring allied industries, among other things, with oil sales totally \$2.6 billion(USD) in 2005, a major revenue earner for the government that additionally provides employment to over 1500 people. NNPC was founded in 1971, when the Nigerian National Oil Company (NNOC) was created after the country signed to a member of OPEC. It was renamed NNPC six years later, while the government decentralized it into nine subsidiaries in 1981. The NNPC significantly augmented its holding in multiple oil ventures amid sustained attempts to make a financially autonomous and commercially integrated entity. NNPC spearheaded the nation's first joint venture equity partnership in collaboration with the Agip oil company in the mid-60s to better manage the resources endowed on us for development, also NNPC masterminded oil exploration to confirm Nigerians position as the top crude oil exporter in Africa in the 1970s with oil revenue boosted from N200million (NGN) to N10billion (NGN) through the decade. The corporation in 2004 unveiled plans to launch the ambitions of West-Africa natural gas pipeline to supply natural gas to the whole sub-region, while in 2005 Nigeria emerged as important exporter of natural gas with her establishment of liquefied natural gas plant in Bonny as part of efforts to end gas flaring by the end of this year. In addition NNPC entered into a \$1 billion (USD) joint venture in the offshore Agbami fields to boost national crude oil production capacity by a further 250,000 barrels from the 2

million barrels per day capacity and the corporation's recent Okapi power plant which will generate its first carbon credit energy in compliance with the Kyoto protocol and related UN resolutions.

With oil accounting for 81% of present government revenue presently, the NNPC has played a major role in trying to reverse decades of economic stagnation and driving massive entrepreneurial growth, curiously achieving rapid enterprise revolution across non-oil sectors, NNPC is confident of improving known Crude Oil reserves from 36 billion barrels to 50 billion barrels by 2015, since the oil industry contribution to job creation, poverty alleviation and rapid national growth cannot be undermined. Enhancing access to capital and improving transmission to both domestic and regional gas markets, establishing strategic partnership with global gas companies to secure presence in international markets achieving production efficiency and selective growth to improve capacity for joint venture operations while rationalizing the NNPC portfolio to ensure focus on high growth potential assets extending refineries and gas based industries to help turn Nigeria into a regional hub for petroleum products, reducing operational constraints and production suspension due to vandalism and violence, implementing further reforms in the oil and gas sector to improve transparency and boost investor confidence, all these will further enhance our benefits from this resource.

The extent to which price of crude oil per barrel fluctuations may transit it to in terms of prediction relies on the market forces of demand and supply at the global stage, as at January 2010 the world price for a barrel of Crude Oil stands at \$100(USD), and

the pace at which development of substitute fuels are being consumed, Crude Oil extraction has had a colossal and immense contribution to the Nigerian economy.

1.4 Aim of the study

Our objective is to empirically examine the presence of (DD) in Nigeria since Crude Oil make up a large part of the export sector and most of its revenue are directly derived from the exportation of Crude Oil, knowing its important to Nigeria and it contributes over 80% of revenue to the Nigerian government, some researches contested against the assuming presence of Dutch Disease thesis in our nation over the years, using the Agricultural sector as the initial resourceful sector that dwindled in place of the manufacturing sector used by other initial studies in (LDCs) and Nigeria.

The vast income generated from the oil segment of our system can be diversified into other sectors to strengthen the economy despite having many potential sectors, this will induce economic growth in the non oil sector or tradable sector since Nigeria is an oil resource extractive dependent country. Therefore there is enough reason to examine the presence of (DD) in Nigeria since her oil resource had failed in achieving the desired economic growth intended.

The research is organized in these categories: in chapter two, a review of related literature regarding Dutch Disease claims in the Nigerian resource sector, chapter three focuses on data and research methodology while chapter four is developed for

the analysis of the model and empirical analysis of the results. Lastly chapter five elaborately present recommendations and conclusions.

Chapter 2

REVIEW OF RELATED LITERATURE

2.1 An Overview

There are numerous theoretical and empirical literatures in existence that discuss the Dutch Disease phenomenon in cross country studies. According to Nina and Pang, “Nigeria’s oil wealth did not bring respite to the undergrowth in the non oil part of the economy, could this be the unavoidable outcome of the resource wealth or due to ill patterned policies of subsequent administrations in governance, this paper shows the extreme volatility of expenses rather than linked to the “Dutch Disease” problem assumed to be behind the disappointing non oil growth pedigree, because fiscal policies had failed to level out volatility in oil revenues while government spending exceeded their targeted oil income, this led to the detection of voracity effects which escalated expenditure fluctuations before the mid 1980s.

Al-mulah, Usama, Che Sab (2010), stated that “ in their similar research paper while investigating the Dutch Disease in Kuwait while looking at the effect of oil prices on the exchange rate which had a fixed exchange rate regime, while using time series data from 1970-2008 which included all oil shocks they used the VaR model, Johansen’s Juselins multivariate cointegration and the Granger causality tested was

implemented in their results and they purported that Kuwait should maintain her pegged or crawling peg regime”.

Mohammed, Pavar and Hassan (2008), illustrated that “they tested the potency of the (DD) phenomenon by checking the reaction between oil prices and real exchange rates using 14 countries as observation which are members of oil exporting countries, they used the Autoregressive Distributed lag (ADRL) bound tests of cointegration so as detect the stability between these two variables in all the nations which yielded a strong claim for the evidence of the (DD) phenomenon”.

While other researchers illustrated the Dutch Disease phenomenon using the effect of foreign aid on countries, Owen.B (2006) stated that “most often it is claimed that aid might causes (DD) with a resultant appreciation of domestic country’s (LREER) which retards the growth of exports therefore hindering the long term growth prospect, his argument was that it was unlikely that it was the financial assistance in aid that will bring the hindrance”.

Mwanzu (2004) also in his paper “said that the (DD) may not manifest in poor income nations that can pull their productive capacities together to catalyze the aid induced increased demand while critical analysis on and prognoses for the (DD) should note country specific situations to avoid misguided policies, he also stressed the that using public resources inefficiently can be more devastating than the strengthening of real exchange rate which may not encompass the (DD)”.

Oyejide .T (1986) emphasized that “the oil wealth of the 1970s affects the exchange rate policy which is particularly a problem in oil rich countries like Nigeria where large capital flow in causes the domestic currency to strengthen against other currencies but policies in the exchange rate being lowered may impede the growth of the non oil sectors especially agriculture which happened between 1974 and 1978 where the naira was overvalued substantially, thereby reducing production incentives for nontradables particularly our cash crop sectors where really undermined initiating the phenomenon of Dutch Disease”. Particularly for the developed countries (DCs), the industrial or manufacturing sector is the initial tradable sector, while in the less developed countries (LDCs), the agricultural aspect, which is undermined by the oil wealth more often is the initial resource sector. Stijns (2003), “emphasized about “deindustrialization” in the (DC) and “de-agriculturalisation” in the (LDC) if the Dutch Disease takes effect”.

Emmanuel .K, Frederico. S, Pablo .A (2008), “ while empirically testing for the (DD) while using disaggregated sectoral data, their research depicted that skyrocketing stages of remittance have expenditure effects that leads to the strengthening of (LREER) and resource shifts impacts that improves the nontradable sector while relegating the tradable aspect of productivity, these features are two aspects of this (DD) phenomenon, the outcome further shows that these impacts survive more strongly under fixed nominal exchange rate measures which Nigeria had used in the past”.

Olusi .J, and Olagunju .M (2005), “empirically in their research investigate the (DD) in Nigeria having detected its presence where lots of previous studies denounced that it existed, using quarterly data from the IMF database, they analyzed it using the VAR approach with (IRF) Impulse Response Function and Variance Decomposition, and their diagnostics revealed the (DD) symptoms though yet to manifest, this will potentially serve as a beacon to the government to stimulate the agricultural industry and other vital sectors”. The oil segment of the system is vast it remains meaningful in that it has since been our bedrock since the early years of freedom from colonial rule with employment chances in the non tradable sector of services, real estates, telecoms now replacing the manufacturing sector

Erling R.L. “ says that the crude oil resource may be (dis)advantageous since oil prosperous countries perform less better than non oil states, this abundance may trigger off displacement of a growth essential for the agriculture or manufacturing sector leading to Dutch Disease”.

Isabell. A, Vagasky .L (1998) stated “in their paper the inter relationship between foreign aids and the real exchange rate in four francophone nations, they used the Salter-swan two sector analysis, the detection of the potential negative effects of aid on a nation’s competitiveness via the strengthening of the (RER) was obvious, using data from 1980-1992, the connection between these two variables was tested and the countries were Burkina Faso, Ivory Coast, Senegal and Togo, the regression estimates using the general knowledge of correlation between the two measuring factors confirmed the nexus which buttresses the theoretical importance between them, even

the monetary factors were jettisoned this is a rough approximation between (RER) and foreign aid, an increasing wage in the early 1980s and budget imbalances proves the possible (DD) effects that had foreign aid had impacted on these four african nations''.

Dynamic response of Import, Export, per capita GDP growth to a global aid shock were strongly correlated to exchange rate overvaluation, evidence suggest Dutch Disease.[(Kang.J.S, Prat.A., Rebucci.A.(2010)].

Considering the less developed countries according to Makochekanwa (2005), he says that although Dutch Disease model suggested that a resource wealth always hurt a country's manufacturing exports, the case of Botswana however defies this resource curse using gravity trade model to test this hypothesis. According to Todaro and Smith (2006), Botswana since independence has developed as an emerging market from its state of doldrum to one with a greater per capita more Turkey, Thailand or Brazil.

Budina et al (2007) investigated the possibility of the Dutch Disease and debt overhang on the growth part of Nigeria since the 1970s. The study found out that although Nigeria experienced oil boom, that boom failed to halt the country's continuous stagnation in the non-oil sector, after careful examination of the government macroeconomic policies over the years and resource management, the study concluded that extreme volatility of government expenditure was the reason behind the dismal non-oil growth and not (DD),the study argues that the country's fiscal policies over the years failed to smooth highly volatile oil income but rather expenditure was even more volatile than income. [(Olusi and Olagunju (2005)]

asserted the presence of (DD) theory in Nigeria using VAR approach and causality tests since variables were time series data have been tested for stationarity using unit root tests of Philip Perron (PP), Augmented Dickey Fuller (ADF) tests.

We shall now focus on the initial LAGR aspect to be the diminishing tradable part instead of manufacturing as earlier hypothesized by other researchers for the Nigerian case and less developed countries, this distinguishes this research from other earlier written paper on this subject.

In summary, an abundance of natural resource may be accompanied by the existence of Dutch Disease, which must be properly investigated to detect its presence, because this availability of natural resources may corrode the quality of social, infrastructure, weaken human and physical capital and thus impede rapid socio-economic growth.

Chapter 3

DATA AND METHODOLOGY

3.1 Introduction

So as to detect the presence of (DD) in Nigeria, this study will investigate the relationship between booming oil segment (B) and the lagging agricultural segment (L) of the nation, and the impact of this crude oil output and other variable on gross domestic product (GDP), since crude oil exports make up the majority of our total exports. It is important to know that crude oil exports and these variables affect the growth rate of GDP. We shall use a type of vector auto regression (VAR) model which is called the Vector Error Correction Model (VECM) and also relate economic theories to the econometric model using the existing statistic data in the country, the EViews 6 would be the diagnostic empirical instrument paramountly for making econometric analysis herein this thesis.

Since we are interested in the estimation of a structural equation, using annual time series data, this involves non stationary variables in assumption using VAR approach to remove the issue of a variable been dependent on another. We have a multivariate context, the conventional wisdom was to generalize this idea of non stationary inherent in time series data and adjust it by implementing the difference(s) of all the non stationary variables used in the regression analysis, for it is proper to have a

linear combination of such integrated variables that is stationary, then such variables are said to be cointegrated but if linear relationship exists amongst these variables in the long run then differencing this estimation leads to misspecification error [Enders (2004)].

In this type of VAR model which involves cointegration we construct a model called Vector Error Correction Model (VECM), we shall include dummy variables because of the Structural Adjustment Programme(SAP) embarked on by the Nigerian Government by changing from fixed to floating exchange rate policies which led to devaluation of the naira by the government and the International Monetary Fund(IMF) in 1986 due to huge external debt of \$33billion,this will enable a precise and efficient prediction.

3.2 Methodology

Firstly, According to Olusi and Olagunju (2005),

$$\chi_0 y_t = K + \sum_{i=1}^n \beta_i y_{t-1} + U_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

$$y_t = C_0 + \sum_{i=0}^n c_1 y_{t-1} + \Sigma_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

$$C_0 = \beta_0 K \mid C_i = \beta_0 \beta_i \text{ for } i = 1, \dots, n \mid P \mid \Sigma_t \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

All variables are expressed in their linear form because they are cointegrated which enables their long run properties, I(0) to be used at long run equilibrium.

3.2.1VAR (Vector Autoregression)

A VAR from another purview can be defined as a systems regression model, that is, there could be numerous dependent variables, if we are not sure that a variable is fully exogenous with transfer function process assuming symmetrism for each variable according to the natural extension. This unique system allows the relativity interrelationship because variables are having impact on each other.

We can have a simplest case of a bivariate VAR

$$\begin{aligned} y_{1t} &= \beta_{10} + \beta_{11}y_{1t-1} + \dots + \beta_{1k}y_{1t-k} + \alpha_{11}y_{2t-1} + \dots + \alpha_{1k}y_{2t-k} + u_{1t} \\ y_{2t} &= \beta_{20} + \beta_{21}y_{2t-1} + \dots + \beta_{2k}y_{2t-k} + \alpha_{21}y_{1t-1} + \dots + \alpha_{2k}y_{1t-k} + u_{2t} \quad \dots (4) \end{aligned}$$

where u_{it} is an iid disturbance term with $E(u_{it})=0$, $i=1,2$; $E(u_{1t} u_{2t})=0$.

$$\begin{aligned} y_{1t} &= \beta_{10} + \beta_{11}y_{1t-1} + \alpha_{11}y_{2t-1} + u_{1t} \\ y_{2t} &= \beta_{20} + \beta_{21}y_{2t-1} + \alpha_{21}y_{1t-1} + u_{2t} \end{aligned}$$

$$\begin{pmatrix} y_{1t} \\ y_{2t} \end{pmatrix} = \begin{pmatrix} \beta_{10} \\ \beta_{20} \end{pmatrix} + \begin{pmatrix} \beta_{11} & \alpha_{11} \\ \alpha_{21} & \beta_{21} \end{pmatrix} \begin{pmatrix} y_{1t-1} \\ y_{2t-1} \end{pmatrix} + \begin{pmatrix} u_{1t} \\ u_{2t} \end{pmatrix}$$

VARs were made famous in econometrics by Sims (1980) as a natural generalization of univariate autoregressive models, that reflects a kind of hybridization between time series model and simultaneous equation models as conceived. VARs were interchangeably used as replacement to wider scale simultaneous equations structural models. The model could be further be related extensively whereby the model includes 1st differences and cointegrating relationships [(a Vector Error Correction Model (VECM))].

3.2.2 Cointegration

According to [Thomas.R.L.(1997), Maddala.G.S. (2005), Brooks.C. (2002)], “emphatically stressed that the harm that exist with time series which we are conscious of, generates spuriousity in regression which sets out a big hindrance in empirical econometrics, to avoiding differencing the series progressively till stationarity is attained, this may lead us inconclusive process where there is no existence of the long run tendencies. The desire to have models which combine both (SR) short and (LR) long run features and maintain stationary in all the variables, is a process this paper cherish and tend not to discard. However in this case if our variables are really related then we should expect them to move together and their random trends would be related to each other and if we combine them together the chances of cancellation of nonstationarity is very high. The variables become cointegrated, and this would only happen when there is really a relationship linking the variables together and cointegration becomes a very powerful way of detecting the presence of economic structures. Also on the other hand, if stochastic trends do cancel then we have cointegration and everything would work even efficiently, the important assumption is that there exist a genuine (LR) relationship between the estimates, though the variables pick up over time (because they move jointly), there would be a peculiar movement that joins them cohesively, because for equilibrium or (LR) to exist we require a linear combination amongst the variables at $I(0)$, then cointegration removes any issue of stationary without differencing, yet it is ensuring the long run features, a type of VAR model that uses this phenomenon is the Vector Error Correction Model(VECM) employed in our empirical studies.

3.2.3 Testing for Cointegration

[(Granger (1981)], “set in motion the enviable feature harmonized between non-stationary processes and the (LR) equilibrium, the ideology of integration as explained here. [(Engle and Granger (1987)], “proceeded to strengthen this claim with another easier test which support cointegrating (that is LR equilibrium) interrelationships”.

Step1: checking variables for various levels of integration and the existence of cointegration we move to the next condition.

Step 2: find the estimated (LR) (cointegrating) interrelationship, if our OLS regressors are consistent as expected, we move on to the next condition.

Step 3: Detect the (cointegration) levels of integration of the error terms. If the estimated residuals gives (LR) equilibrium as found to be stationary then the variables are cointegrated, $\hat{\epsilon}_t \sim I(0)$, then we do not accept the null hypothesis that the variables are not at all cointegrated.

Step 4: At this stage the use of (VECM) is next, after getting cointegration amongst the deviations (residuals) from the estimated equilibrium in our regression, we employ the (VECM) and we breakdown the SR and LR impacts of these measuring factors (variables) so as to understand the adjusted coefficients of the lagged residuals of LR combination as observed in step 2. Also using the Johansen’s approach which involves cointegration in multiple equations since $n > 2$ using EViews we both see the

Trace and the maximal Eigenvalue statistics suggesting existence of cointegration vectors. EViews then reports results regarding the coefficients of the variable matrices which first is unnormalized and then normalized later, after establishing the numerous cointegrating vectors we proceed to the estimation of VECM by clicking on Procs/make VAR command in EViews which gives us two choices of VAR types and if there is cointegration we can estimate with the VECM. A joint test that a particular row of coefficients are zero confirms the test of the weak exogeneity of the corresponding variables.

3.2.4 The Vector Error Correction Model (VECM)

If the measuring factors at time (t) moved together as defined; $U_t \sim I(0)$. Thus we can express the linkage between these variables with a VECM specification.

$$Y_T = \beta_1 + \beta_2 X_t + u_t \dots \dots \dots 3.2.4.1$$

This has the advantage of including both long and short run information. It is general agreed by economists that we are mainly aroused by the (LR) relationship, so as to achieve this status and overcome any fault associated with this, the knowledge of integration and VECM are very helpful in this regards.

Let us assume that Y_T and X_t are jointly at I (0), due to non-stationarity problem

$$Y_T = \beta_1 + \beta_2 X_t + u_t \dots \dots \dots 3.2.4.1$$

$\widehat{\beta}_1, \widehat{\beta}_2$ are poor estimates taking differencing will ensure stationarity, $\Delta Y_T \sim I(1)$, $\Delta X_t \sim I(1)$

$$\Delta Y_T = a_1 + a_2 \Delta X_t + \Delta u_t \dots \dots \dots 3.2.4.2$$

So $\widehat{\alpha}_1, \widehat{\alpha}_2$ are correct estimates, this is a SR impact, so we must estimate the LR impact. If in the a special case there is a linear relationship between y_T and x_t , that is I(0), i.e. they are cointegrated.

$$\widehat{u}_t = y_T - \widehat{\beta}_1 - \widehat{\beta}_2 x_t \dots \dots \dots 3.2.4.3$$

This connects y_T and x_t in the long run, the VECM $\widehat{u} \sim I(0)$ is specified as:

$$\Delta y_T = a_0 + b_1 \Delta x_t - \pi \widehat{u}_{t-1} + y_T \dots \dots \dots 3.2.4.4$$

Combination of both LR and SR tendencies in this model b_1 is called the relationship multiplier for the (short run) that signals swift reaction to an impact in x_t has on y_T , and π is the feedback effect where it depicts the quantity of instability in the former time which is adjusted, i.e. the degree at which any instability in former times is affected by reactions of y_T . Of course $\widehat{u}_{t-1} = y_{t-1} - \widehat{\beta}_1 - \widehat{\beta}_2 x_{t-1}$ so β_2 been the long run response. The above equation now emphasizes the basic approach of cointegration and VECM, everything is stationary because they are predicted to be I(1) variables and the residuals from the levels of our regression is also stationary by assumption of cointegration, so the equation fully conform to our set of assumption about classical linear regression model and OLS should perform well.

Advantages of VECM are namely, it is an easier model in figuring out the extent of instability ratification in the former period with fruitful outcome for the economy, also if we have cointegration, the VECM are estimated at 1st differencing which cancels trends especially from amongst variables thereby resolving the problem of spurious regressions, furthermore it has an easier compliance into the dual approach

which could be general or specific in methods to econometric analysis that searches for the nearest VECM model which suits our stated datum, on this note the most appreciative feature of VECM emanates the assumption that instability deviation term is a non-fluctuating variable (by definition of cointegration), the VECM has crucial impact whereby variables cointegrated together means that there exist correction phenomenon and disallows the deviations in the LR from spiraling out of control. According to [(Enders:1995)], “he admits that measuring factors in question are cointegrated, the VAR cannot be written in first differences hence the causality tests would not be performed using t-tests or F-tests we then use the Vector Error Correction Model.

3.2.5 Impulse Response Function (IRF)

This phenomenon detects the sensitivity that dependent variables in the VAR shows relative to the variations in individual measuring factors, for individual variables from particular equation solely, unit variation is placed to the deviation and the outcome on the VAR system over time are recorded. The VAR model is expressed as a (VMA) Vector Moving Average as long as the system is at equilibrium, and the variations stemmed off. VMA description is vital characteristics of Sims's (1980) approach that permits us to detect period pathway of numerous variations on the measuring factors inherent in the VAR structure. IRF refer to a unit shock to the errors of one VAR equation alone, while the error terms of the other are held constant in the VAR system.

3.2.6 Variance Decomposition

This provides a slightly different approach for detecting VAR structure dynamics. They give the share of the shifts in the dependent measuring factors are explained by their own variations versus variations to the numerous measuring factors. Particular variation to a singular measuring factor have direct effect on the variable while it will also be transferred all other measuring factors through the flexible system of VAR. Variance decomposition detects the amount of the s-step ahead predicted error variance of a given measuring factor is illustrated by innovations to singular explanatory measuring factor for $s= 1,2,3,\dots,n$. Pragmatically it is often seen that its peculiar series variations explain vast proportion of the predicted error variance of the series in a VAR. In most sense Impulse responses and Variance decomposition provides familiar input contribution.

3.2.7 Model Specification

Enders (1995) said if the variables in question are cointegrated, the VAR cannot be written in first differences, hence causality tests cannot be performed using t-tests and F-tests. Different techniques have been used in various studies to test the direction of causality between crude oil export and agricultural output. However, in this section we shall carry out an empirical investigation on the impact between these two variables on each other, so as detect the presence of Dutch Disease in the Nigerian economy. In doing so, we confine ourselves to the framework of “Johansen’s Approach of Cointegration”, Vector Error Correction Model (VECM), Impulse Response Function (IRF) and Variance Decomposition to explain this effect. The aim is to find out whether crude oil exports affect agricultural output in Nigeria, hence a case of the detection of the “Dutch Disease” hypothesis.

3.2.8 Johansen's Approach/Methodology of Cointegration

$$x_t = A_0 + A_1 x_{t-1} + A_2 x_{t-2} + A_3 x_{t-3} + A_4 x_{t-4} + A_5 x_{t-5} + A_6 x_{t-6} + e_{1t} \dots \dots \dots 3.3.1$$

$$x_t = A_0 + A_1 x_{t-1} + e_{2t} \dots \dots \dots 3.3.2$$

$$\Delta x_t = A_0 + \Pi x_{t-1} + \Pi_1 \Delta x_{t-1} + \epsilon_t \dots \dots \dots 3.3.3$$

x_t = the (n.1) vector of variables

A_0 = (n.1) matrix of intercept terms

A_i = (n.n) matrices of coefficients

e_{1t} and e_{2t} = (n.1) vector of error terms

3.2.9 Vector Error Correction Model (VECM)

$$\Delta Y_t = a_0 + a_1 Y_{t-1} + b_0 x_t + b_1 X_{t-1} + u_t \dots \dots \dots 3.3.2.1$$

Where $u_t \sim iid(0, \sigma^2)$, b_0 shows the SR reaction of Y_t after a shift in x_t , the LR effect is given when the model is in stability where:

$$Y_t^* = \beta_0 + \beta_1 x_t^* + u_t \dots \dots \dots 3.3.2.2$$

So the LR elasticity between Y and X is captured by $\beta_1 = (b_0 + b_1) / (1 - a_1)$, here we need an assumption that $a_1 < 1$ in order that the short run model (3.4.4) above converges to a long run solution. Thus what is important is to connect this with the concept of cointegration because of cointegration, $\hat{\epsilon}_t \sim I(0)$ and therefore $\hat{\epsilon}_{t-1} \sim I(0)$ even in the VECM representation as shown by equation (3.3.2.3) underneath, we have a regression that contains only I(0) variables and allows us to use both LR information and SR disequilibrium dynamics, that is the most important features of the VECM.

$$\Delta y_t = \mu + \sum_{i=1}^{n-1} a_1 \Delta Y_{t-i} + \sum_{i=0}^{m-1} b \Delta X_{t-i} - \Pi \hat{\epsilon}_{t-1} + \epsilon_t \dots \dots \dots 3.3.2.3$$

3.2.10 Impulse Response Function

In a linear model, the impulse responses trace out the effects of different sized shocks because they are not history dependent but for non linear they are history dependent, showing the impact of an ϵ_t variation on the period pathway of the system depends on the magnitudes of the current and subsequent shocks. The impulse responses are given by:

$$y_t = \sum_{i=0}^{\infty} b^i \epsilon_{t-i} \dots\dots\dots 3.3.3.1$$

3.2.11 Variance Decomposition

VARs that are unrestricted are over parameterized, they are not usually important for SR predictions. Whichever way, comprehending the features of the predicted errors is highly important in detecting the connection among the measuring factors in the structure. Of course the VMA and the VAR models possess similar information it's rather easier and a better description of the characteristics of the predicted errors in terms of the (ϵ_t) sequence.

$$x_{t+n} = \mu + \sum_{i=0}^{\infty} \phi_i \epsilon_{t+n-i} \dots\dots\dots 3.3.4.1$$

Nevertheless, Impulse Response and variance decompositions are also called (called innovation accounting) are important instruments used to detect the connection among the measuring factors, if the interrelationship among numerous innovations are minute the identification mismatch is not likely to be especially useful, the optional orderings should yield similar impulse responses and variance decompositions, of course the contemporaneous shifts of many economic indices are extensively correlated, since we have considered the hypothesis testing in a VAR

framework and re examine the interrelationship between crude oil export and agricultural output.

3.3 The Data Collection and Analysis

Firstly, annual data largely taken from the Central Bank of Nigeria's Statistical Bulletin (CBN), International Finance Statistics (IFS), World Trading Statistics (WTS), World Bank (WB), Federal Statistics Office (FSO), and International Monetary Fund (IMF) were used.

This thesis is targeted at detecting the status of economic indices that is assumed to impact (DD) and how economic measuring factors of the Dutch Disease are interrelated in terms of empirical analysis using the ideas of econometrics, using the existing statistic data to relate economic theories to the econometric model, using (RGDP, Export of crude oil, Inflation rate, Exchange rate, Agricultural output, Long run , Short run Interest rates and dummy variables). Most Dutch Disease study in Nigeria were focused on 1970s during the oil boom, before the economic crisis that premeditate the Structural Adjustment Programme (SAP), therefore these earlier studies neglected the SAP and exchange rate regime effect from fixed to floating exchange rates. In this thesis paper, whether or how the (SAP, crude oil boom, economic crisis and reform) have affected the Nigerian economy, leading to whether or not the presence of Dutch Disease exist is checked by preparing a time series estimation. We need to give a special attention to SAP, economic crisis and reforms in Nigeria, since all money related statistics took a new dimension after 1986 due to SAP and government issues. The analysis are built on the time series estimated using

annual data from (1970-2009), 40 observations in each variation of any estimation, for the reason of data availability, yet this data covers all the important events, ranging from the crude oil boom, SAP, economic crisis, to the government reforms. The applied approach used for estimation is a type of VAR called the Vector Error Correction Model, the under listed items are the abbreviations for the estimates namely; XQ export quantity of crude oil stands for quantity of exported crude oil, REER stands for the real effective exchange rate which is the amount of naira per 1\$.U.S dollar. The value should become higher (depreciated) when the Nigerian currency loses its value so that the Nigerian economy has more edge to exports, while INFL represents the inflation rate. In order not to ignore this fact of fixed or floating exchange rate regime on the mentioned indices, the dummy index is accounted for, which is directed as “DUMMY”. As earlier stated, the dummy index has been initiated to account for the structural difference between the data from 1986 and afterwards.

As regards this aspect data covering (1970 to 2009) were used, including agricultural output figures were sourced from CBN statistics bulletin; also sourced (see Olusi and Olagunju,2005), diagnostic tools for empirical analysis are Johansen’s Approach to Cointegration, Vector Error Correction Model(VECM) involving impulse response function and variance decomposition. Using time series data with EViews 6 as the tool for econometric analysis, it needs stationary variables if we find cointegration, we proceed to VECM and use other empirical approaches.

Chapter 4

ANALYSIS OF THE MODEL AND EMPIRICAL RESULTS

4.1 Introduction

I have made stationarity checks because time series data are always presumed to be non stationary and my data are annual data from (1970 – 2009), on the basis of preliminary tests most of the variables are cointegrated together and we proceed to VECM. Non stationary variables wander away from their means when there is a shock and we have higher variances which are not desirable features at all but there could be linear combination or relationship between these non stationary variables, if it thus exist then we say they are cointegrated then there is LR equilibrium between the variables. Since they are cointegrated at order (1), we move on to VECM, EViews found cointegration, afterwards it transforms this into VECM, which is simply a modified VAR according to cointegration. VARs are used for policy analysis (we mean the analysis of the effect of random shocks on various variables in the model especially between crude oil export and agricultural output), as we all know that random shocks are caused by sudden changes in the disturbances. Though some of the data had scaling problems, so to avoid this conflict we use these new transformations namely $LAGR=LOG(AGR)$, $LGDP=LOG(GDP)$, $LREER=LOG(REER)$, $LXQCRUDEOIL=LOG(XQCRUDEOIL)$, while $LRRATE$

and SRRATE remain unchanged. Hence most of the results are reported as elasticities since they are in double log form after resolving the scaling problem. In testing for cointegration, linear deterministic trend is retained including the exogenous variable D86, as emphasized in our methodology.

This section will provide and analyze the estimated results based on the econometric techniques in the economic literature.

4.2 Cointegration

Table 4.2.1 Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

No of CE(s)	Eigen value	Statistic	Critical value	Prob**
None*	0.722631	47.44903	46.23142	0.0369
At most 1	0.592802	33.24285	40.07757	0.2398
At most 2	0.50341	25.89966	33.87687	0.3269
At most 3	0.358797	16.44316	27.58434	0.6279
At most 4	0.194764	8.014941	21.13162	0.9028
At most 5	0.107281	4.198881	14.2646	0.8378
At most 6	0.015077	0.562101	3.841466	0.4534

Table 4.2.2 Trace test indicates (1) cointegrating eqn(s) at the 0.05 level

No of CE(s)	Eigen value	Trace Statistic	0.05 Critical value	Prob**
None*	0.722631	135.8106	125.6154	0.0103
At most 1	0.592802	88.36159	95.75366	0.1447
At most 2	0.50341	55.1187	69.81889	0.4141
At most 3	0.358797	29.21908	47.85613	0.7578
At most 4	0.194764	12.77592	29.79707	0.9015
At most 5	0.107281	4.760982	15.49471	0.8337
At most 6	0.015077	0.562101	3.841466	0.4534

Unrestricted Cointegration Rank Test (Trace)

h_0 None (no cointegration)

h_1 At most 1 cointegration

Trace statistic > Critical value, we reject h_0 and accept the alternate. Then we move to the next step below,

Also further hypothesize as follow,

h_0 : At most CE (1)

h_1 : At most CE (2)

Here because Trace statistic < Critical value we do not reject the h_0 of a CE (1). Using the next hypothesis result and looking at the tables above. Since Trace statistic > Critical value, we do not accept the null of no cointegration and accept the alternate of at most CE (1). The same is done for the maxeigen value too, they both give same results here. We reject the null hypothesis of no cointegration, in favour of cointegration (1). Both tests give us cointegration (1) relationship, we are very sure of long run equilibrium among these variables, although each variable are non-stationary but their combination cointegrate together, we proceed to VECM analysis.

Normalized cointegrating coefficients (standard error and t-statistics in parentheses)

Table 4.2.3 Johansen's Cointegration among variables

Cointegrating EQ	LAGR	LGDP	LREER	LRRATE	INFL	LXQCRUDEOIL	SRRATE
Coint Eqn 1	1	1.303268	0.701554	-38.06007	5.654055	1.622593	47.09184
Standard Errors in ()		(0.1466)	(0.41082)	(11.9461)	(0.82944)	(0.68667)	(16.7506)
t-statistic in []		[-8.88995]	[1.70769]	[-3.18598]	[6.81671]	[2.37027]	[2.81135]

As seen from table 4.2.3, being normalized on the LAGR, since other variables belong to the RHS of the equation we observe that the relationship between LAGR and LXQCRUDEOIL are negatively related between themselves, with LXQCRUDEOIL coefficient now negative and the t statistic is significant which shows an evidence of Dutch Disease in the economy between these two variables, while LRGDP has a positive relationship with LAGR and highly significant t-statistic value also.

4.3 Vector Error Correction Model

Table 4.3.1 Vector Error Correction among the variables

Cointegrating EQ	LAGR	LGDP	LREER	LRRATE	INFL	LXQCRUDEOIL	SRRATE	C
Coint Eqn 1	1	-1.37584	0.724572	-2.8824543	-2.9858	0.627703	21.16144	-7.73959
Standard Errors in ()		(0.08778)	(0.1805)	(6.43853)	(0.57177)	(0.32033)	(8.31406)	
t-statistic in []		[-15.6744]	[4.01431]	[-0.43869]	[-5.222]	[1.95953]	[2.81135]	

As seen from the Table 4.3.1 above, after been normalized on the LAGR since other variables belong to RHS of the equation we observe the relationship between LAGR and LQXCRUDEOIL is still statistically significant while the coefficient of LQXCRUDEOIL is negatively related to LAGR, this predicts the existence of DD in the economy. It is estimated that a 1% rise in crude oil export will amount to a 0.63% decrease in Agricultural output in Nigeria.

IMPULSE RESPONSE FUNCTION (IRF).

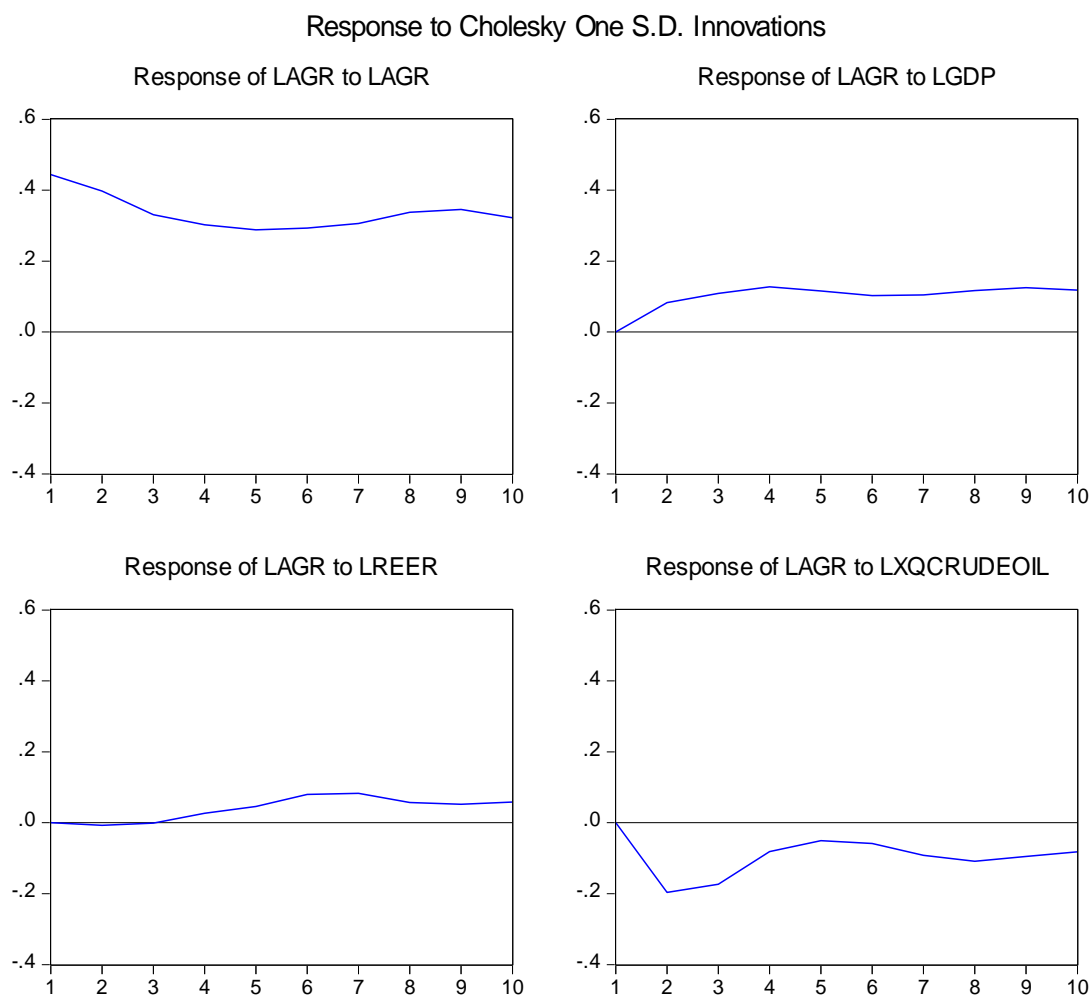


Figure 4.3.1 Impulse Response Function between LAGR and few variables from (1970-2009).

The contractionary effect between LXQCRUDEOIL and LAGR is established. This is observed from the response of LAGR due to innovations in LXQCRUDEOIL, we can see a sharp decline initially and also sustained this declination all along, this tends to suggest that the Nigerian economy is afflicted by the Dutch Disease.

VARIANCE DECOMPOSITION.

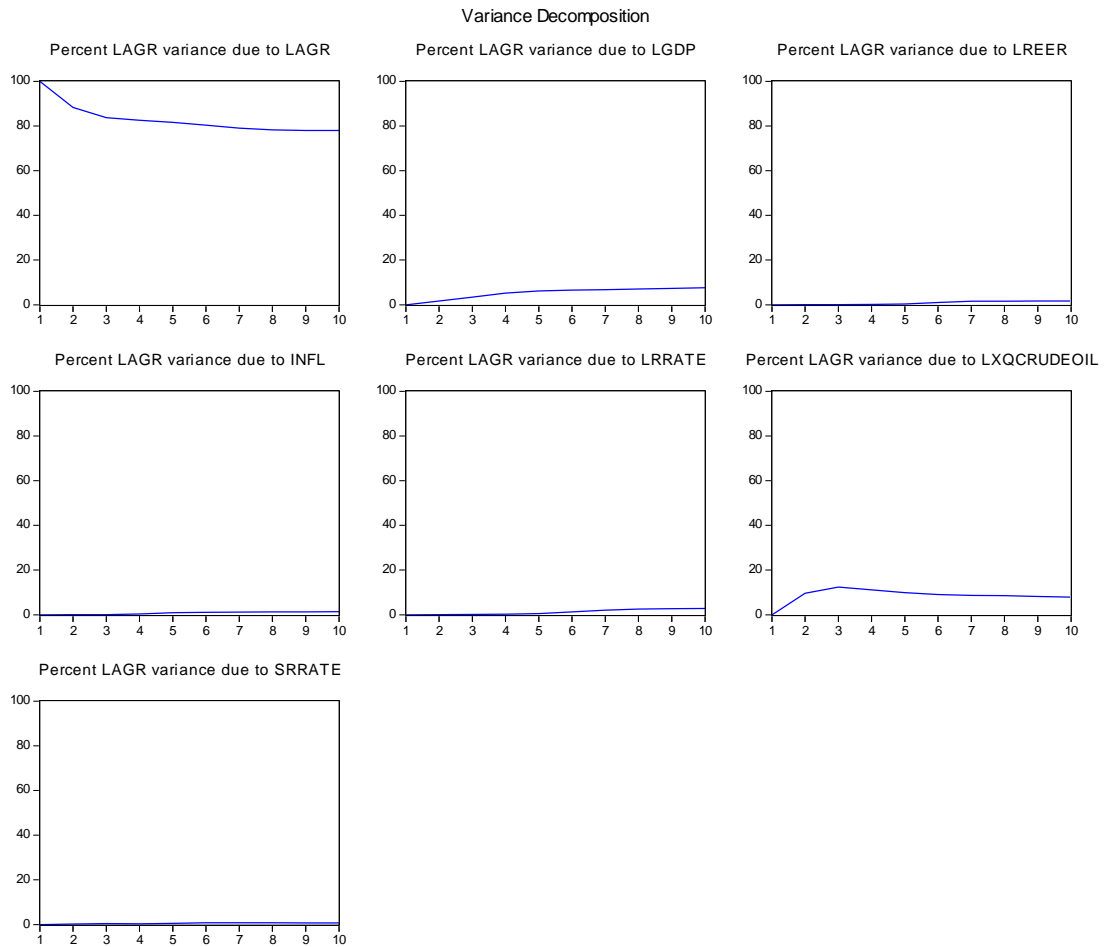


Figure 4.3.2 Variance Decomposition between LAGR and other variables.

Table 4.3.2 Variance Decomposition

PREIOD	S.E	LAGR	LGDP	LREER	INFL	LRRATE	LXQCRUDEOIL	SRRATE
1	0.443841	100	0	0	0	0	0	0
2	0.63406	88.3241	1.704358	0.013782	0.001902	0.095255	9.589839	0.270768
3	0.745204	83.67596	3.373089	0.01016	0.05568	0.149882	12.34521	0.390019
4	0.820525	82.58458	5.193775	0.114678	0.370337	0.231146	11.16625	0.3392238
5	0.88495	81.58643	6.170024	0.364475	0.921117	0.538223	9.926111	0.493624
6	0.949889	80.34266	6.529863	1.019231	1.097703	1.248812	8.996283	0.765443
7	1.018005	78.98451	6.743605	1.547933	1.182573	2.059183	8.651974	0.830219
8	1.091862	78.22647	7.015503	1.619278	1.264357	2.58056	8.509634	0.7842
9	1.161434	77.99165	7.357699	1.633887	1.321992	2.7721	8.187853	0.734819
10	1.218034	77.92128	7.63344	1.714815	1.364982	2.780225	7.89615	0.689127

As seen from Table 4.3.2 and the Figure 4.3.2 above they show the variances of the variables as proposed by the models, these reflect the share of the variations for each index that is linked to its particular innovations and the factors used. Variations in LAGR are explained essentially by LGDP (after the first stage), also the LXQCRUDEOIL export explains up to 20% variation in LAGR, with this, LXQCRUDEOIL is the highest vital index that explains variations in LAGR apart from LGDP if own innovation is ignored. This further strengthens our claims that LXQCRUDEOIL is a vital origin of variation in LAGR, having similarity to the claims discovered in the (IRF), and we can also say that Dutch Disease exists in the Nigerian economy.

Chapter 5

CONCLUSIONS AND POLICY RECOMMENDATION

5.1 Conclusion

This research paper has brought to limelight that contrary to previous findings of many researchers who based their study on Nigeria and other oil producing nations who made peculiar findings that this country is not suffering from the Dutch Disease, using different data like (annual data) we found a practical confirmation of Olusi and Olagunju (2007) findings that Dutch Disease exist in the Nigerian case, although in the long run.

The problem with previous studies from proper possible explanation was that authors presumed the tradable sectors of Less Developed Countries as something different from LAGR, they assumed it as (Manufacturing) like in developed countries. This problem or missing link which caused many authors from not finding Dutch Disease cases in Less Developed Countries was just the joint assumption of the “[(manufacturing)]” and the LXQCRUDEOIL sectors as the “[(resource tradable sectors)]” which is in place of LAGR, the core initial export dependent sector even Nigeria and LDCs, and relatively LXQCRUDEOIL sector which is newly discovered and enhanced. Furthermore, it is an obvious fact in Nigeria that LAGR and not “Manufacturing” had been the means of sustaining the economy that is, the traditional leading foreign exchange process, which is also the ancient “tradable

sector” of most LDCs in which Nigeria too is one. Even it is a clear known fact that “[Manufacturing]” in the Less Developed Countries is yet to develop to full blown proportion where their products would become globally competitive, while receiving foreign finance or marketability and become tradable like the developed countries.

Oil export may have hampered the growth led development of the Agricultural sector in Nigeria, the dwindling tendencies of our LAGR sector can be linked to the sudden windfall from crude oil, but in its transmission to the REER appreciation according to the Dutch Disease hypothesis, we can see from the analysis of the result that a major variation in REER can be linked to crude oil export innovations looking at the Variance Decomposition, which the Impulse response Function would have similar result as visible based on this empirical studies, According to Akinlo and Odusola (2003) though the Naira was devalued against the dollar in 1986 by the government, from (1970-1986) the two currencies were at par, showing high appreciation of the domestic currency though we enjoyed major oil booms in the 1970s and in subsequent years too we have enjoyed this booms too, yet nominal exchange rate value of the naira has depreciated greatly against the dollar due to efforts of floating exchange rate mechanisms and the resultant cheapening of our exports abroad, the naira still seems strong because of excess in flow of foreign currencies.

Many authors have linked Nigeria’s case to weak institutions, corruption, lack of proper resource management and technical knowhow, but it is quite imperative to underplay this effects and resound the presence of Dutch Disease phenomenon in Nigeria, it’s therefore crucial for the government to run a non monolithic economy

heavily dependent on the crude oil sector and put more effort, money and resources into Agriculture and other major sectors which in the long run has potentials for sustenance, sufficiency and enhance economic development, thereby revamping the system in a short while and giving it a long run success. The recent hike in Agricultural products like Cassava will help strengthen our export based sector which is an appreciated trend of enhancement for cassava farming in essence and the LAGR sector in particular, it is obvious that the country's financial breakthrough and leverage is however not dependent on the dollar revenues earning capabilities of unrefined or partially processed LAGR products but through the linkages of core parts of the economy like Agriculture, Crude oil to other sub sector of the economy, thereby ushering the much clamoured diversification of resources to fruitfulness and ensure industrial revival which will lead to higher earned revenues, economic growth, job opportunities, reduce unemployment, increase the inflow of foreign direct investment, higher inflow of global capital from the rest of the world in pursuance of profits, aid guarantee of security, increase GDP per capita of citizens, increase the stability and confidence in government, high provision of infrastructure, aid technological advancement, enhance qualitative service delivery, better education, Human Development Index increase with higher life expectancy and the overall economy improves better, lowering the dependence laid on the primary "extractive" sector which LXQCRUDEOIL is categorized as been part of currently in Nigeria.

5.2 Policy Recommendations

Firstly, my recommendation to the government would be that since the crude oil sector is the back bone of the economy in terms of revenues sources, Nigeria faces a

great risk in its growth rate of Real GDP mainly because of our over reliance on crude oil export as it constitutes over 95% of our export earnings, which is risky because of price volatility and substitutability for Crude oil as technological advancement improves and if our Oil wells suddenly dry up before anticipated like in the Dutch case. We all know that Oil price fluctuations negatively cause a decline in oil revenues where countries like Nigeria that is Oil export revenue dependent, will face budget shortfall or deficit but diversification will mitigate this risk and reduce adverse effect of oil fluctuations and help the economy stay healthy. Therefore, one of the policy implication should be that policy makers should be aware of non oil export sectors existence and continue to support its functionality in the face of this oil boom we are enjoying so as to hedge our risks from oil resource gain properly.

Secondly, through positive externalities we can support the non oil sectors by using revenues from oil sector to aid economic growth and development of these sectors progressively, while other externalities will also lead to a rapid expansion of the non oil sectors namely;

- Enhancing production methods and quest for innovations
- Improving the human capital stocks by initiating high qualitative trainings for domestic staffs
- Promoting the efficiency of competitiveness in managerial acquisition skills

It is high essential that nations that are highly resource dependent like heavily oil dependent nations should develop their non oil export sector, Myint (1977) argues

that for a nation to ensure a strong external trade balance ,many economies need to minimize the fact that a country may not be able to take full advantages of its external economic potentials unless its internal domestic opportunities is consolidated and improved, while supporting this non oil sectors will attract people to invest more in these sectors and endear innovations as people become highly motivated through diversification instinct.

This improved performance will lead to new innovative ideas which will improve non oil export products, for instance when the domestic government provides incentives and welfare packages for the non oil export sectors namely;

- Local value added
- Labour intensive mode of production
- Export oriented industries
- Investments in less economically advantaged areas
- Financial grants, loans and capital

Leveraging the efficiency and promoting the credibility of the non oil exported products will impact positive on the overall ability of the industry so as to have competitive edge at the global market, while improved efficiency will attract foreign oil subsidiaries worldwide to invest in Nigeria as a continental base for foreign operations. Also the development of local content through encouragement to domestic and foreign investors to increase production bases in Nigeria for both oil and non oil export, while improving the country from an extractive sector to a productive sector vis a vis reform programmes and their unbiased implementations.

Investment by foreign counterparts and all stakeholders genuinely will aid the flow of technology into Nigeria which will solve the imminent power supply problems, improve production efficiency standard through learning on the job, higher value added to our products and an overall suitable economy. Accordingly, a sovereign wealth fund can be generated to fulfill three major functions, firstly, it is better to invest the crude oil revenues abroad and not allowing the proceeds to distort the national economy, secondly, by proposing a price assumption for budget objectives that the funds can be used to remove fluctuations in revenue availability if the global market prices exceed our targeted benchmark while if the resource price decreases than the assumed price, the revenues will be used to buffer up the government budget. Thirdly, as the LXQcrudeoil, gas and mineral resources are in limited quantity and cannot be assumed to limitless as the accumulated revenues can be preserved for the future generations and we avoid the appreciation of REER by investing the resource revenues abroad then the government decides how much of this capital flows home. This is how to extend the benefits of the resource boom even when it is ended, otherwise if it lasts longer growing capital interest from foreign assets can create a secondary boom for the national economy.

Finally, the rapid growth we have seen today in Asia, Emerging market economies and Asian Tigers especially China, India, Turkey, Singapore, Taiwan, South Korea, Malaysia, Thailand ,Indonesia, Brazil and many others has led to higher demand for crude oil related products while Crude oil prices remain as high as ever due to major unrest in the middle east countries with prices of oil per barrel as high as \$126 which is over 120% more than what we have since in the last ten years, aiding high flow of

foreign capital for oil based economies like Nigeria but there is no assurance this process will continue forever, In view of this the Nigerian government should properly channel this excess crude oil funds to improve the non oil export sector, strengthen the oil sector itself by making it more productive and less extractive based, therefore the other non oil export sector should also concentrate on having competitive advantage rather than depending on price competitiveness through government subsidies, as this efforts will steady rescue the economy to economic excellence.

REFERENCES

Akinlo, A.E., and A.F. Odusola (2003), “Assessing the Impacting of Naira Depreciation on Output and Inflation. Applied Economics” Vol. 35, 691-703.

Bienen .H. and Gersovitz.M. (1982), “Nigeria, Absorbing the Oil Wealth”, 2nd edition, Euromoney publications, London, United Kingdom.

Central Bank of Nigeria: “www.cenbank.org/documents/data.asp”

Central Bank of Nigeria (2008) Statistical Bulletin, Abuja: Research Department.

Central Bank of Nigeria (2002). The Changing Structure of the Nigerian Economy and Implications for Development. (Abuja: CBN).

Chris, B (2002), “Introductory Econometrics for Finance”, Cambridge University Press, United Kingdom.

Corden, M. and Neary, J.P (1982), “Booming Sector and De-Industrialization in a Small Open Economy”, Economic Journal 92: pp. 825- 846.

Dickie, R.k., “Development of Crude Oil Production in Nigeria, and the Federal Government Control Measures” (paper presented to the Institute of Petroleum, London, 1966).

Dimitrios, A. and Hall.S.G (2007), “Applied Econometrics, A Modern Approach”, 1st edition, Palgrave Macmillan, United Kingdom.

Enders. W, (2005)“Applied Econometrics Time Series”, 2nd edition, Wiley, New York.

Engle, R.E. and Granger, C.W.J., (1987), “Cointegration and Vector Error Correction Representation, Estimation and Testing”, *Econometrics* 55, 251-276.

Ezeala-Harrison, F., “Structural Re-Adjustment in Nigeria: Diagnosis of a Severe Dutch Disease Syndrome”, (paper published online July 3rd, 2006).

Falck, H. (1992), “Foreign Aid and Dutch Disease, The Case of Tanzania”, Minor Field Study Series No. 23, Department of Economics at the University of Lund.

Genova, A. and Falola, T. (2003) “Oil in Nigeria: A Bibliographical Reconnaissance History in Africa”, Vol. 30, pp. 133-156.

Gujarati, D.N. (1995), “Basic Econometrics” 3rd edition, New York: McGraw-Hill.

Hamilton, J.D. *Time Series Analysis*, Princeton (N.J): Princeton University Press.

IMF (2003) International Financial Statistics, Washington, D. C.: International Monetary Fund.

Iyoha, M.A. and Ekanem .O.T. (2002). Introduction to Econometrics. (Benin: Mareh Publishers).

Johansen, S. (1988), “Statistical Analysis of Cointegration Vectors”, Journal of Economics Dynamics and Control, Vol. 12, pp. 231-54.

Kang, J.S., Prati, A. and Rebucci, A., “Aids, Growth and Export: A Time Series Perspective of the Dutch Disease Hypothesis” (presented to the Inter-American Development Bank, 2010)”. .

Looney, R. (1991), “Diversification in a Small Oil Exporting Country; The Impact of the Dutch Disease on Kuwait’s Industrialization. Resource Policy”: Vol. 17, pp. 1, 31-41.

Maddala, G. and Kim, I. (2000). “Cointegration: Themes in modern econometrics”, Cambridge University Press, United Kingdom.

Madujibeya, S.A. (1976), “Oil and Nigeria’s Economic Development”, African Affairs, Vol. 75, No. 300, pp. 284-316.

Mankiw, G., P. Romer, and D. Weil. 1992, "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economics* 107 (May): 407-443.

Makochenkanwa, A., "An Empirical Test of the Dutch Disease Hypothesis on Botswana's Main Export", (A paper published online in 2010).

Odularu, G.O. (2007), "Crude Oil and the Nigerian Economic Performance", *Oil and Gas Business Journal* (June, 2008).

Olusi, J.O. and Olagunju, M.A., (2005), "The Primary Sectors of the Economy and the Dutch Disease in Nigeria", *The Pakistan Development Review* 44: pp 159-175.

Ojameruaye, E.O. (2004), "Managing the Dutch Disease in Nigeria", *World* 11/8/04, Ocnus.Net, File://A: Dutch Disease 1 .htm.

Robinson, M.S. (1964), "Nigerian Oil: Prospects and Perspectives", *Nigeria Journal of Economics and Social Studies*: pp 219- 29.

Rodriguez, C. M., "Dutch Disease in Saudi Arabia", Department of Economics, Lund University (published December 2006).

Sachs, Jeffrey D., and Andrew M. Warner (2001). "The Curse of Natural Resources", *European Economic Review* 45: 827-838.

Sala-I-Martin, Xavier, and Arvind Subramanian (2003) “Addressing the Natural Resource Curse: An Illustration from Nigeria”, NBER Working Paper 9804 (June).

Salisu, Mohammed (2000), “Corruption and Economic Growth in Nigeria,” Paper Presented at the International Economics Study Group (IESG) Easter Conference, University of Wales Conference Centre, Great Britain.

Sims. C.A. (1980), “Macroeconomic and Reality”, Paper published in *Econometrica*, Vol 48, Issue 1, pp 1-48, (Jan).

Stevens, P., (2003), “Resource Impact-Curse or Blessing. A Literature Survey”.
http://www.ipieca.org/downloads/Social/PStevens_resources_impact_final_doc.

“The Dutch Disease”, *The Economist*, November 26, 1977: pp 82-83.

Todaro, M.P. and S.C. Smith (2004). *Economic Development*. (8th edition). (India: Pearson Educational Ltd). Pp 141-144, 360-417.

Tradingeconomics.com

Walters, E (2004), “Applied Econometric Time Series”, 2nd edition, Hamilton Printing, New Jersey, USA.

Warr, P. (1985) Indonesia’s Other Dutch Disease. In P. Neary and S. V, Winbergen (eds.) *Natural Resources and the Macroeconomy*. Oxford: Basil Blackwell Ltd.

APPENDIX

APPENDIX A:

CointEq1	0.172825	0.316670	-0.036109	-0.025701	0.238268	0.082616	-0.012785
	(0.25687)	(0.22530)	(0.16073)	(0.01667)	(0.06727)	(0.08602)	(0.01357)
	[0.67282]	[1.40553]	[-0.22466]	[-1.54205]	[3.54217]	[0.96038]	[-0.94200]
D(LAGR(-1))	-2.009413	-1.495282	-0.308503	-0.021185	-0.666524	0.559915	-0.021503
	(0.93404)	(0.81926)	(0.58445)	(0.06060)	(0.24460)	(0.31281)	(0.04935)
	[-2.15130]	[-1.82515]	[-0.52785]	[-0.34956]	[-2.72497]	[1.78996]	[-0.43571]
D(LAGR(-2))	-0.459469	-0.914801	-0.200281	0.054463	-0.140359	-0.348938	0.034282
	(1.05954)	(0.92934)	(0.66298)	(0.06875)	(0.27746)	(0.35484)	(0.05598)
	[-0.43365]	[-0.98436]	[-0.30209]	[0.79222]	[-0.50586]	[-0.98337]	[0.61237]
D(LGDP(-1))	1.994191	1.435774	0.268209	0.025386	0.588266	-0.689235	0.019133
	(0.93969)	(0.82422)	(0.58799)	(0.06097)	(0.24608)	(0.31470)	(0.04965)

	[2.12218]	[1.74198]	[0.45615]	[0.41637]	[2.39057]	[-2.19013]	[0.38536]
D(LGDP(-2))	0.212650	0.703843	0.219396	-0.043101	0.147711	0.390859	-0.027203
	(1.09415)	(0.95969)	(0.68463)	(0.07099)	(0.28653)	(0.36643)	(0.05781)
	[0.19435]	[0.73340]	[0.32046]	[-0.60712]	[0.51552]	[1.06667]	[-0.47056]
D(LREER(-1))	0.062458	-0.082030	0.133726	0.013300	-0.107702	-0.117259	0.010695
	(0.38278)	(0.33574)	(0.23951)	(0.02484)	(0.10024)	(0.12819)	(0.02022)
	[0.16317]	[-0.24433]	[0.55833]	[0.53551]	[-1.07446]	[-0.91472]	[0.52882]
D(LREER(-2))	-0.063170	-0.059876	-0.025297	-0.010569	-0.198689	0.013192	-0.004308
	(0.38358)	(0.33645)	(0.24002)	(0.02489)	(0.10045)	(0.12846)	(0.02027)
	[-0.16468]	[-0.17796]	[-0.10540]	[-0.42464]	[-1.97800]	[0.10269]	[-0.21256]
D(LRRATE(-1))	3.340254	2.445990	-2.379084	-0.539749	2.281653	-3.123087	0.419107
	(10.0114)	(8.78112)	(6.26434)	(0.64958)	(2.62169)	(3.35278)	(0.52896)
		[0.27855]	[-0.37978]	[-0.83092]	[0.87030]	[-0.93149]	[0.79232]

	[0.33365]						
D(LRRATE(-2))	1.106769	0.218643	-10.58932	0.917225	3.634435	-3.923645	1.077160
	(10.2085)	(8.95402)	(6.38767)	(0.66237)	(2.67330)	(3.41880)	(0.53938)
	[0.10842]	[0.02442]	[-1.65777]	[1.38477]	[1.35953]	[-1.14767]	[1.99704]
D(LXQCRUDEOIL(-1))	-1.920480	-1.599231	-0.454424	0.047948	-0.788043	0.421272	0.006633
	(0.87879)	(0.77080)	(0.54988)	(0.05702)	(0.23013)	(0.29431)	(0.04643)
	[-2.18536]	[-2.07476]	[-0.82640]	[0.84090]	[-3.42433]	[1.43141]	[0.14286]
D(LXQCRUDEOIL(-2))	-0.050039	-0.376948	0.083378	0.032719	-0.521832	-0.349735	-0.008299
	(0.93695)	(0.82181)	(0.58627)	(0.06079)	(0.24536)	(0.31378)	(0.04950)
	[-0.05341]	[-0.45868]	[0.14222]	[0.53820]	[-2.12681]	[-1.11458]	[-0.16765]
D(SRRATE(-1))	-7.904392	-9.182934	0.482405	1.186923	-5.981273	1.562108	-0.160994
	(12.6890)	(11.1297)	(7.93979)	(0.82331)	(3.32288)	(4.24952)	(0.67044)
	[-0.62293]	[-0.82508]	[0.06076]	[1.44164]	[-1.80003]	[0.36760]	[-0.24013]

	D(SRRATE(-2))	-4.870525	-4.677328	12.86021	-1.090226	-6.055683	5.348601	-1.363844
		(12.6801)	(11.1219)	(7.93420)	(0.82273)	(3.32054)	(4.24652)	(0.66997)
		[-0.38411]	[-0.42055]	[1.62086]	[-1.32513]	[-1.82370]	[1.25953]	[-2.03568]
	C	0.214825	0.221976	-0.012242	-0.003772	0.031307	0.020837	0.001362
		(0.10866)	(0.09530)	(0.06799)	(0.00705)	(0.02845)	(0.03639)	(0.00574)
		[1.97709]	[2.32911]	[-0.18006]	[-0.53504]	[1.10025]	[0.57261]	[0.23730]
	D86	0.129981	-0.154546	-0.754401	0.088688	0.175445	-0.259195	0.079811
		(0.58255)	(0.51096)	(0.36452)	(0.03780)	(0.15255)	(0.19509)	(0.03078)
		[0.22312]	[-0.30246]	[-2.06960]	[2.34636]	[1.15006]	[-1.32856]	[2.59297]
Period	S.E.	LAGR	LGDP	LREER	LRRATE	INFL	LXQCRUDEOIL	SRRATE
1	0.148641	15.6141 2	16.60540	3.750021	1.084707	0.432041	62.51371	0.000000
2	0.252472	24.0731 3	5.944551	1.526599	2.712099	2.781147	61.92497	1.037501
3	0.312543	23.9190 4	3.908338	1.947926	1.966675	2.294614	61.36106	4.602349
4	0.353578	24.6083 7	3.059970	3.616492	1.786859	1.846610	59.50086	5.580848

5	0.374389	25.3278 5	2.840139	4.070605	1.847706	1.686488	58.71975	5.507455
6	0.393337	24.0433 9	3.049500	3.728095	1.804619	1.911689	59.84706	5.615647
7	0.418857	22.8979 4	2.997873	3.547415	1.609720	1.816916	61.87702	5.253115
8	0.447340	23.3139 7	2.737321	3.472386	1.571193	1.777462	62.09004	5.037631
9	0.471807	23.6407 2	2.481873	3.365564	1.489949	1.723013	62.25039	5.048500
10	0.493002	23.8426 1	2.310676	3.462004	1.365506	1.641213	62.15175	5.226245

APPENDIX B:

Table B1: Data for Estimated Variables

YEAR	INFL	LAGR	LGDP	LREER	LRRATE	LXQCRUDEOIL	SRRATE
1970	0.017	7.543114	8.347353	5.966941	0.04	12.85697755	0.03
1971	0.016	7.593475	8.45861	5.976909	0.04	13.20402631	0.03
1972	0.094	7.528923	8.49552	5.977898	0.04	13.38571177	0.03
1973	0.046	7.500364	8.577347	5.909251	0.04	13.45256888	0.03
1974	0.135	8.204754	9.675313	5.975919	0.04	13.58699008	0.03
1975	0.34	8.941074	10.20994	5.97195	0.04	13.34971885	0.03
1976	0.211	8.830309	10.28009	6.04306	0.035	13.51010162	0.03
1977	0.215	8.909451	10.35839	5.993612	0.035	13.48037343	0.035
1978	0.133	8.811801	10.28235	5.977898	0.055	13.42117083	0.0475
1979	0.116	8.705083	10.30722	5.949783	0.055	13.60192741	0.0475
1980	0.1	8.779834	10.35923	5.80676	0.065	13.39431233	0.0575
1981	0.214	10.96802	12.23185	5.911203	0.065	13.11452272	0.055
1982	0.072	10.9929	12.2045	5.935688	0.08	12.90335626	0.0725
1983	0.2321	10.98546	12.13134	6.104525	0.08	12.8790962	0.0725
1984	0.407	10.93165	12.12031	6.428622	0.1	13.01829092	0.0975
1985	0.047	11.09359	12.21124	6.319707	0.1	13.09515661	0.0925
1986	0.054	11.1863	12.23549	5.714591	0.1	13.09516483	0.0925
1987	0.102	11.15064	12.22982	4.5712	0.158	12.8752191	0.149
1988	0.56	11.24836	12.30082	4.576153	0.143	12.98493182	0.134
1989	0.5047	11.3007	12.37467	4.46026	0.212	13.1663439	0.189
1990	0.075	11.34267	12.49706	4.380275	0.23	13.21448484	0.196
1991	0.1301	11.37943	12.48891	4.238156	0.201	13.28079858	0.1571
1992	0.448	11.40027	12.51122	4.051263	0.205	13.31182604	0.205
1993	0.5717	11.41417	12.52392	4.142658	0.2802	13.2421249	0.236
1994	0.5703	11.43856	12.52616	4.759521	0.15	13.26740527	0.15
1995	0.7284	11.4744	12.54756	4.594413	0.1427	13.33246222	0.1362

1996	0.2927	11.51509	12.59047	4.801805	0.1355	13.38271022	0.1294
1997	0.107	11.55708	12.61826	4.93253	0.0743	13.42000568	0.0704
1998	0.079	11.5974	12.64719	5.061519	0.1009	13.4406571	0.102
1999	0.0662	11.64895	12.65135	4.376134	0.143	13.40978041	0.1268
2000	0.0693	11.67797	12.70436	4.388257	0.1044	13.44166039	0.106
2001	0.1887	11.71605	12.78548	4.494015	0.1009	13.42236426	0.102
2002	0.1288	12.15548	12.97896	4.492561	0.1557	13.10381237	0.1631
2003	0.1403	12.22298	13.07639	4.43687	0.1188	13.10381237	0.1431
2004	0.15	12.284	13.17605	4.462339	0.1221	13.50952873	0.1369
2005	0.1786	12.35218	13.23914	4.60517	0.0868	13.64848703	0.1053
2006	0.0824	12.4236	13.2977	4.674883	0.0826	13.65378825	0.0975
2007	0.0538	12.49304	13.3602	4.655388	0.0949	13.67331454	0.1029
2008	0.1158	12.55642	13.41832	4.758578	0.127	13.6812119	0.1291
2009	0.124	12.59364	13.48276		0.132	13.64246298	0.1194

Table B2: Estimated Data with Dummy Variable D86

YEAR	INFL	LAGR	LGDP	LREER	LRRATE	LXQCRUDEOIL	SRRATE	D86
1970	0.017	7.543114	8.347353	5.966941	0.04	12.85697755	0.03	0
1971	0.016	7.593475	8.45861	5.976909	0.04	13.20402631	0.03	0
1972	0.094	7.528923	8.49552	5.977898	0.04	13.38571177	0.03	0
1973	0.046	7.500364	8.577347	5.909251	0.04	13.45256888	0.03	0
1974	0.135	8.204754	9.675313	5.975919	0.04	13.58699008	0.03	0
1975	0.34	8.941074	10.20994	5.97195	0.04	13.34971885	0.03	0
1976	0.211	8.830309	10.28009	6.04306	0.035	13.51010162	0.03	0
1977	0.215	8.909451	10.35839	5.993612	0.035	13.48037343	0.035	0
1978	0.133	8.811801	10.28235	5.977898	0.055	13.42117083	0.0475	0
1979	0.116	8.705083	10.30722	5.949783	0.055	13.60192741	0.0475	0
1980	0.1	8.779834	10.35923	5.80676	0.065	13.39431233	0.0575	0
1981	0.214	10.96802	12.23185	5.911203	0.065	13.11452272	0.055	0
1982	0.072	10.9929	12.2045	5.935688	0.08	12.90335626	0.0725	0
1983	0.2321	10.98546	12.13134	6.104525	0.08	12.8790962	0.0725	0
1984	0.407	10.93165	12.12031	6.428622	0.1	13.01829092	0.0975	0
1985	0.047	11.09359	12.21124	6.319707	0.1	13.09515661	0.0925	0
1986	0.054	11.1863	12.23549	5.714591	0.1	13.09516483	0.0925	1
1987	0.102	11.15064	12.22982	4.5712	0.158	12.8752191	0.149	0
1988	0.56	11.24836	12.30082	4.576153	0.143	12.98493182	0.134	0
1989	0.5047	11.3007	12.37467	4.46026	0.212	13.1663439	0.189	0

1990	0.075	11.34267	12.49706	4.380275	0.23	13.21448484	0.196	0
1991	0.1301	11.37943	12.48891	4.238156	0.201	13.28079858	0.1571	0
1992	0.448	11.40027	12.51122	4.051263	0.205	13.31182604	0.205	0
1993	0.5717	11.41417	12.52392	4.142658	0.2802	13.2421249	0.236	0
1994	0.5703	11.43856	12.52616	4.759521	0.15	13.26740527	0.15	0
1995	0.7284	11.4744	12.54756	4.594413	0.1427	13.33246222	0.1362	0
1996	0.2927	11.51509	12.59047	4.801805	0.1355	13.38271022	0.1294	0
1997	0.107	11.55708	12.61826	4.93253	0.0743	13.42000568	0.0704	0
1998	0.079	11.5974	12.64719	5.061519	0.1009	13.4406571	0.102	0
1999	0.0662	11.64895	12.65135	4.376134	0.143	13.40978041	0.1268	0
2000	0.0693	11.67797	12.70436	4.388257	0.1044	13.44166039	0.106	0
2001	0.1887	11.71605	12.78548	4.494015	0.1009	13.42236426	0.102	0
2002	0.1288	12.15548	12.97896	4.492561	0.1557	13.10381237	0.1631	0
2003	0.1403	12.22298	13.07639	4.43687	0.1188	13.10381237	0.1431	0
2004	0.15	12.284	13.17605	4.462339	0.1221	13.50952873	0.1369	0
2005	0.1786	12.35218	13.23914	4.60517	0.0868	13.64848703	0.1053	0
2006	0.0824	12.4236	13.2977	4.674883	0.0826	13.65378825	0.0975	0
2007	0.0538	12.49304	13.3602	4.655388	0.0949	13.67331454	0.1029	0
2008	0.1158	12.55642	13.41832	4.758578	0.127	13.6812119	0.1291	0
2009	0.124	12.59364	13.48276		0.132	13.64246298	0.1194	0