Impact of Oil Dependence on the Nigeria's Economic Growth

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ABSTRACT

Crude oil is a product with an unlimited value. Its benefit is not substitutable in virtually all the economic sectors of the presents century as of yet. This is why it has a relatively inelastic demand. It is also believed that crude oil instigates overall development and stirs economic growth for economies that are fortunate enough to be possessed with such resource. Notwithstanding recent empirical studies in this area has revealed that resource poor countries grow relatively faster than resource rich countries and that there is a negative correlation between resource dependence and economic growth. This study aims to capture the effect of oil dependence on the Nigeria's economic growth from 1973 to 2013. Applying the ARDL bounds testing co-integration procedure, the oil rents ratio to GDP was used as a proxy for oil dependence and a significant negative correlation was discovered between oil dependence and GDP per capita, which was robust to the specification employed. The export sector value added had an insignificant negative correlation with GDP per capita in the long run, this is due to the high level of dependence on oil. Thus validating the presence of Dutch disease in the Nigerian economy. The study suggested the expansion of Foreign Direct Investment and sterilization of oil rents overseas by fostering Incentives so as to reduce the oil price shocks and the negative effects of crude oil prompted capital inflow in the Nigeria's economy.

Keywords: oil dependence, Economic growth, Nigeria, comparative advantage, Natural resources, GDP.

ÖZ

Ham petrol ürün olarak sınırsız bir değere sahiptir. Günümüz yüzyılında, ham petrolün ekonomi sektörlerine faydaları ikame bulamamıştır. Bu yüzden, nispeten esnek olmayan bir talebe sahiptir. Aynı zamanda, ham petrol genel anlamdaki gelişmeyle birlikte bu kaynağa sahip şanslı ekonomilerde büyümeye sebep olmaktadır. Bu alandaki son ekonomik çalışmalar, kaynak yoksun ülkelerin kaynak zengini ülkelere nispeten daha hızlı büyüdüğünü ve kaynak bağımlılığı ile ekonomik büyüme arasında negatif bir ilişkinin olduğunu ortaya koymuştur.

Bu çalışma, 1973'ten 2013'e kadar geçen dönemde petrol bağımlılığının Nijerya'nın ekonomik büyümesi üzerindeki etkilerini gözlemlemeyi amaçlamaktadır. ARDL sınır testi eş- bütünleşme yöntemi uygulayarak, petrol bağımlılığını ölçmek amacıyla petrol kiraları'nın gayrisafi yurtiçi hasılaya (GSYIH) oranı kullanılmış ve petrol bağımlılığı ile kişi başına GSYIH arasında negative bir ilişki bulunmuştur. Bu durum varsayılan özelliklerle tutarlılık göstermektedir. Ayrıca, ihracat sektörü katma değeri, petrol bağımlılığının yüksek olması sebebiyle uzun vadede kişi başına düşen GSYİH ile önemsiz negatif bir korelasyon olduğunu göstermiştir.

Böylelikle, Nijerya ekonomisinde Dutch Disease varlığı kanıtlanmaktadır. Çalışmada, Nijerya ekonomisinde, ülkeye hızlı sermaye akışından doğan ham petrolün olumsuz etkilerini ve petrol fiyat şoklarını azaltmak amacıyla ülke ekonomisine yabancı yatırımı teşviklerini geliştirmekle birlikte yurt dışı petrol kiralarında ekonomiyi geliştirici teşviklerin verilmesini önerilmektedir.

Anahtar Kelimeler: Petrol Bağımlılığı, Ekonomik Büyüme, Nijerya, karşılaştırmalı üstünlük, Doğal Kaynak, GSYIH.

DEDICATION

I dedicate this project to Almighty Allah for the opportunity he gave me to undertake this project, to my parents for their support and effort, my brothers and sisters, and my entire family members.

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LIST OF ABBREVIATIONS

AEO	African Economic Outlook
RGDP	Real Gross Domestic Product
ECM	Error Correction Mechanism
GDP	Gross Domestic Product
OLS	Ordinary Least Squares
ADF	Augment Dickey Fuller
NPC	National Planning Commission
BNP	Banque Nationale de Paris
HO	Heckscher Ohlin
ARDL	Autoregressive Distributed Lag
WTO	World Trade Organisation
WDI	World Bank Development Indicators
GMM	Generalized Method of Moments
UNSTAT	United Nations Statistical Database

Chapter 1

INTRODUCTION

1.1 Background of the Study

Crude oil is widely believed to instigate overall development and stir economic growth for economies that are fortunate enough to be possessed with this resource, this belief is not based on evidence because recent studies in this area has revealed that oil deprived economies grow relatively faster than oil dominated economies. In fact, the consequence of oil rich economies tends to contradict this whole perception. High level of corruption, violence & rent seeking culture, poverty at the highest level, slow growth rates and inequality are some of the socio economic weakness that defines oil rich economies. The Nigerian economy has experienced a persistent economic growth over a decade now. As of 2014 the annual real GDP increase from 6.3% to around 7% in 2015 (AEO, 2015). Mining, agriculture and crude oil extraction are the oriented primary production. The oil and gas reports for over 65% of gross real outputs and over 80% of foreign exchange revenue in 2013. About 4.14% government revenues and foreign exchange was accounted for manufacturing and other construction sectors (NPC, 2014).

Even the non-oil sector which has not been given much attention in the past decade has experienced a tremendous growth they are the service sector, housing & construction and real estate (World Bank, 2014).

One sector that grew so fast in the past decade is the services sector, which has an increasing share of GDP from 25% in the year 2000 to 57% in 2015 (BNP, 2015). The present driver of growth in the Nigeria's economy is the non-oil sector, with the agriculture and manufacturing sector respectively contributing about 21% and 9% while the services sector generated around 57% (AEO, 2015). Thus the economy is more services-oriented and also diversifying, particularly through real estate, telecommunication & information sector and wholesale & retail trade. The Nigeria's 2015 expectation was for moderate growth rate of 5%, this is due to slow recovery of the global economy, global financial developments and oil-price volatility. However, there was a rapid fall in fiscal revenues because of the low oil price but the overall effect was quite less on the non-oil sectors. The services sector is however expected to continue to be the driver of growth. An adjustment policy was implemented by the government so as to shore up non-oil income and tighten government expenditure to compensate for diminishing oil rents.

1.2 Statement of the Problem

Nigeria depends heavily on the oil sector for most of the infrastructural activities, economic development and government spending. However, with the discovery of oil in some parts of the world, the lack of stability of the global economy and high volatility of oil prices, Nigeria's oil export to major economies like the United States has constantly declined. The resource based growth strategy followed by Nigeria has failed to improve economic growth whereas most developing countries followed industrialization strategy which led to their economic growth. Oil dependency will not aid sustainable economic growth, thus Nigeria must industrialize and diversify.

1.3 Research Questions

The research questions can be summarized as:

a. What is the impact of oil dependence on the Nigeria's economic growth?
b. Would Nigeria achieve sustainable growth with a resource based growth policy?
c. What has been the reason behind Nigeria's volatile growth?

1.4 Research Methodology

This research work will utilize time series analysis to investigate the impact of oil dependence on the Nigeria's economic growth.

This study covers the period of 1973 to 2013. The ARDL bounds test will be applied to investigate the possible equilibrium long run relationship among the variables.

1.5 Objectives of the Study

The objective of this study is to analyze the role of Nigeria's oil dependency on its economic growth, the study would clearly:

I. Identify how lack of diversification affects the Nigeria's economic growth.
II. Recommends the Nigeria's government on how to diversify its economy for a sustainable growth.

1.6 Organization of the Study

There are six chapters in this thesis. Chapter one is the introduction which includes: Nigeria's economic structure, the research questions, research methodology, objectives of the study and work coordination.

Chapter two covers the theoretical literature review. Chapter three is the empirical aspect of the literature.

Chapter four will discuss the methodology used throughout the research including: research design, sources of data, model specification and method of analysis.

Chapter five is composed of empirical results and interpretation. Chapter six contains the conclusion remarks and policy recommendations.

Chapter 2

THEORETICAL LITERATURE REVIEW

This chapter will help us understand the effect of resource dependence on economic growth. Two views will be discussed, the mainstream economist view and the structural economist view. According to the mainstream economist there will be an inevitable growth as long as a country continues to produce and export goods of which they have comparative advantage on. The structural economist argued against comparative advantage and emphasize on diversification and industrialization as the key to growth. Over the years economist try to understand the phenomenon behind slow growth and also solve the problem of poor growth. Mainstream economist view promote the doctrine of comparative advantage while structural economist promote diversification and industrialization and argues against comparative advantage. This chapter will review the mainstream economist view that reference comparative advantage based on H.O model of factor endowment. The structural economist literature will examine the effect of price volatility of commodities, terms of trade volatility and specialization.

2.1 Mainstream Economist View on Resource Dependence

According to the mainstream economist, a country should produce and export based on their comparative advantage. The theory of comparative advantage suggests higher economic benefit of one country than the other thereby producing at a lower cost. Other countries will also benefit if they produce a product of which they have advantage on, hence accepting the advantage cost of the other trading country. This

is what mainstream beliefs in for specialization, trade and international division of labor. This is why some countries produce agricultural products while others produce industrial goods (O'toole 2007).

The H.O principle of comparative advantage states that countries produce and export the good of which they have in abundance. In this model we consider two goods, two factor and two countries and also assume both countries have similar technology, similar preferences and also engage in free trade of goods and different factor endowment (Feentra 2003). Mainstream economist belief that when two countries have different factor endowment, they should export the commodity of which they have comparative advantage on, which will lead to specialization and also efficient use of resources thereby bringing about gains from trade (WTO 2010). A country with capital abundance should export capital intensive goods and import labor intensive goods according to H.O model, while a country with labor abundance should export labor intensive goods and import capital intensive goods (Clarke et al. 2009).

The attempt to prove the theory has been going on for years by many economists meanwhile; most of the test did not perform well. Notwithstanding economist are still working to explain the theory by adjusting variables to improve the result.

Leontief (1953) tries to authenticate the validity of the comparative advantage principle by studying the US economy. He used the economic data on input and output reports and trade data to estimate the H.O Samuelson model. He measures the direct and indirect use of labor and capital in all the exporting sectors, so as to know the number of labor and capital needed in the production of one million dollar of the

US exports and import. Leontief finding shows that each employee works with capital worth $18200 in producing imports and $13700 in producing exports. Therefore Leontief discovery was not consistent with the H.O theory because in 1947 United State was capital abundant and his findings came to be known as Leontief paradox. Nonetheless Stern and Maskus (1981) modified the Leontief model to account for natural resources. Therefore the labor intensive goods Leontief added in his model where actually natural resource intensive goods, hence the error was fixed.

Kemp and Long (1984) run three different tests and in the first method, the good is produced by using one renewable and one non-renewable resource, Second method, the good is manufactured by using only non-renewable resources and the third method, good is produced with two renewable and a nonrenewable resource. They came to a conclusion that a country with more nonrenewable resource should specialize in that resource and produce related goods. This study shows that comparative advantage plays a big role in trade i.e. the variation in endowment factor (WTO, 2010)

Another study was run by Clarke et al. (2009) tested the authenticity of the H.O model by using two Asian countries. Singapore as a capital abundant country was compared with Malaysia which is less capital abundant but relatively labor abundant. They try to figure out if this is correspondent with the H.O model, they find that the labor rich country will export more labor intensive good while the capital intensive country will export more capital commodities. In comparison of the Singapore and the Malaysian export, they realized that Singapore exports are relatively capital goods while Malaysian exports are relatively labor intensive. However, the percentage ratio of capital intensive export in Singapore was 32%, which by H.O

model principle, it is relatively low. Despite, they concluded that the trade between Malaysia and Singapore in 1997 was in accordance with the comparative advantage theory and therefore they both experience growth.

Wood and Berge (1997) argued on a factor which decides if a country exports final or primary good i.e. depends on the number of skilled labor relative to endowment of natural resources. They tried to understand why East Asian counties grow so fast with manufacturing while Africa grow slowly producing primary goods, so they concluded that the variation does not trigger from export composition but rather due to availability of natural resource and human capital. They hypothesize the H.O model by replacing the variables, labor and capital with land and skill. Where skill is estimated by years of schooling and natural resource with land area divided by the population of adult. Labor intensive good should be produced by a resource rich country and unskilled labor. Because skills needed in producing primary goods is less than skills needed in manufacturing. Therefore comparative advantage depends on agriculture and extraction of resources in a country with low labor skill and land endowment ratio. According to their study, a cross-country correlation was captured between export composition and development. However primary good exporters grow slower than manufacturing exporters. But the correlation is being attributed on the bases of skill as a determinant of comparative advantage.

H.O model and comparative advantage literature indicated evidence that growth depends on the comparative advantage that one country has over another. Mainstream economist belief that there will be an inevitable growth as long as a country continues to produce and export the good of which they have in abundance and can produce efficiently. However, many questions were raised on the principle

of comparative advantage and why market and information are not perfect. Lot of studies performed better after the reconstruction of the variables.

This section will explain the role of diversification as the determinant of economic growth.

2.2 Structural Economist View

Structural economist argues many claims of mainstream economist. The idea of less reliance on primary good production and diversification is what the structural economist view lies on.

Prebisch and Singer (1950), promotes diversification in manufacturing and emphasized that diversification is the key to growth. They argue that in the long run primary good tend to have a falling price trend. Because primary goods have an inelastic demand compared to household income. The demand for manufactured goods gets more and more elastic as house hold income raise and increase much faster than primary goods demand. Nonetheless, the primary good as a share of GDP will also fall. Therefore there will be a slower growth for countries that rely on primary good compare to those who rely on manufactured goods. So, they recommend a closed economy to allow the infant manufacturing industries to grow.

Blattman et al. (2007) argues that resource dependent economies experience slow growth not because of commodity price trend but because of price volatility of commodities. Price volatility and trend of primary goods explains the global income divergence. When there is a level of instability of income this will result in reduced investment, internal instability and a diminishing economic growth. They found that

when there is a price shock, capital inflows falls leading to less interest in foreign investment which also results in slower growth.

The empirical literature on the next section supports diversification as the determinant for economic growth; this is in line with the structural economist view. Which includes Sachs and Warner (1995), Al-Marhubi (2000), Lederman and Maloney (2003), Herzer and Lehnmann D (2006), Olomola P.A (2007) and Hesse (2008).

Chapter 3

EMPIRICAL LITERATURE

3.1 Empirical Literature

Sachs and Warner (1995, 1997) study the effect of natural resource abundance on economic growth by using a cross country data sample from 1971 to 1989. According to their analysis, economies with significant natural resource export tended to have lower growth rate, even after controlling for the important variables that triggers economic growth such as trade policy, initial per capita income, investment rate, government efficiency and other variables. The negative relationship still holds. Therefore they provide an easy theoretical model of endogenous growth to help and observe the relationship.

Al-Marhubi (2000) study the relationship between export diversification and growth by using a cross country data sample from 1961- 1988 for 91 countries. He used real GDP as the dependent variable and income, population, investment, openness and human capital as the independent variable. OLS estimation was used for the test and he finds that all t-statistic are heteroscedastic constant. The result shows that the relationship between export diversification and growth was relatively large and was robust to series of model specification and various measures of export diversification. Conclusively, growth performance and economic efficiency depends on distortions to exterior trade and market oriented resource allocation based on the comparative advantage that a country has over another.

Lederman and Maloney (2003) study empirical trade structure and economic growth relationship. The study focused on export concentration, natural resource endowment and intra industry trade. Therefore they tested for the robustness of the relationship among proxies, estimation methods and by using controlled variables. Hence, they constructed a cross sectional and a panel extending from 1975-1999 i.e. 5 year observation. The study implies that natural resource abundance positively affect growth meanwhile export concentration impedes growth, despite physical and accumulation of human capital is being controlled.

Rodriguez and Sanchez (2005) provide evidence on the impact of oil prices on economic activities of the core countries. They used a linear and a non-linear model to carry out a multivariate VAR analysis. Three approaches were employed including asymmetric, scaled and net specification. In the first section: they tested for the significance of the oil prices variables. In second section: he compared the various specifications then examines the effect of oil price shock on GDP. Thereby presenting an impulse and accumulative response function. A non-linear effect of oil prices was found on real GDP. To be specific, GDP growth is found to be significantly affected by an increase in oil prices than a decline in oil price. Meanwhile oil price increase seems to have a negative impact on the oil importing countries economic activities except for Japan. Nevertheless, the impact of oil prices on the GDP growth varies among two oil exporting countries i.e. Norway benefited from the shock while UK was negatively affected.

Herzer and Lehnmann D (2006) also hypothesize that export diversification leads to growth through learning by doing and learning by exporting driven by competition in the global market. Therefore they tested their claim by using an augmented Cobb

Douglas production function using an annual time series data for Chile from 1962-2001. According to the co-integration model three different methodologies were used including Johansson trace test, a dynamic OLS method and a multivariate error correction model. They also applied a time series method to capture the structural change in the Chilean economy. The estimation result shows that export diversification plays a significant role in improving the economic growth.

Olomola P.A (2007) studied the impact of oil rent on the economy of the oil exporting African nations. He tested his claim by using panel data for 47 oil exporting countries from 1970-2000. He also included 13 non-oil exporting countries. The finding shows that there was an evidence of resource curse in the oil exporting countries. In addition oil exporting African countries are significantly affected including their exchange rates. Dutch disease syndrome could not illustrate the resource curse in these regions which includes Africa. Conclusively oil rents failed to promote growth.

Hesse (2008) provides an evidence that diversification will lead to sustainable growth in the long run. He estimated an augmented Solow growth model with data on cumulative GDP per capita growth and average export concentration from 1961-2000 to see the relationship between per capita GDP growth and export diversification. Using a scatter diagram, he discovered that lot of the East Asian nations appears in the lower right corner; meaning that, they have lower export concentration level and on the left upper corner, the growth performance was poor implying high level of export concentration. Hesse set to capture the relationship between total trade and GDP by including an openness variable and excluding OECD countries. Therefore there was a robust negative effect on GDP per capita

growth for export concentration. Hence, some countries experience higher per capita income growth due to their diversification in the past decade. He then tested for non-linearity among two variables. The study shows that the export concentration has more non-linear effect on poorer countries compared to the richer countries.

Subramanian et al (2009) used vector error correction model (VECM) to show the correlation between the economic sectors including the services sector, the manufacturing sector, agricultural sector and the trade sector. The aim of the study was to detect the presence of short run and long run relationship between the sector of Romania and Poland economy. However, the finding shows that the sectors moved together over the years this is because their growth was interdependent.

Bhattacharyya et al. (2010) try to understand the relationship between corruption, natural resources and the level of democratic institution on the relationship. They set up a game theory model with an incumbent president and a challenger. With good democratic institutions a poor contender will be able to imitate the good incumbent president at equilibrium. As the probability difference gets bigger the better the democratic institutions. They used panel data from 1980 – 2004 to test their claim and 124 countries were used for the observation. The variables used in the model are income, corruption, natural resource and democracy. The study shows that resource rent have a negative effect on income and natural resources. The idea here is, natural resource lead to a higher level of corruption. To confirm if corruption is influenced by the democratic institution quality, they added an interaction term which includes lagged measure of democracy and resource revenue. The study suggests that resource revenues results in corruption practices except democracy yields over 0.93 and also a POLITY2 yield 8.6. To validate their findings in 2004 aPOLITY2 score of 9 was

generated by Botswana and a POLITY2 score of 8 was generated by Mexico and Bolivia.

A similar study on diversification was run by Kadyrova (2011) he applied dynamic panel model for GMM estimator across countries and used 88 countries for his observation from 1962-2009. Therefore, computing the herfindahl index of export concentration to get the whole data from 1962-2009 by using two different dataset and then he added it to the augmented Solow growth model estimation equation. According to his findings there is an evidence of strong positive correlation between export diversification and per capita income growth as well as the economic growth of a country.

Chapter 4

METHODOLOGY

4.1 Introduction

This chapter will focus on the type & sources of data used including the methodology, model specification and data analysis techniques.

4.2 Sources and Type of Data

The data used for this research were obtained from the World Bank WDI and United Nations Statistical Database (UNSTAT). The study will employ time series from 1973 to 2013.

The United Nations Statistical Database (UNSTAT)

- The Import sector value added to GDP in US Dollars; The services sector contributions to GDP in US Dollars; The Export sector contributions to GDP in US Dollars

World Bank (WDI);

- The share of oil rents in GDP; The Naira/Dollar exchange rate

4.3 Data Analysis Techniques

To test for the stationarity of the variables, Augmented Dickey Fuller (ADF) unit root test will be employed so as to know the co-integration order of the series. ARDL bounds test will be applied to model the co-integrating long run and the short run relationship among the variables.

4.4 Model Specification

For the purpose of this study, a log linear specification is suggested;

$$lnGDP = \beta_0 + \beta_1 lnEXPT + \beta_2 lnEXCH + \beta_3 lnSERV + \beta_4 InIMP + \beta_5 OILDEP + u \quad (1)$$

Equation above shows the model in an explicit form. β is the intercept term.

The variables include;

lnGDP - Natural log of real per capita GDP

OILDEP - Oil dependence (ratio of oil rents to GDP)

lnEXCH - Natural log of real US/Nigerian bilateral exchange rates

lnSERV - Natural log of services real contribution to GDP.

InIMP - Natural log of imports real contribution to GDP.

lnEXP - Natural log of exports real contribution to GDP.

Ut - Random disturbance error term

For this study we will use the Autoregressive Distributed Lag (ARDL) procedure to co-integration recommended by Pesaran et al. (2001) to determine the short run and long run relationships between variables. This methodology is chosen according to certain criterias. First, this approach provides unbiased estimates of the model in the long run and a reliable t-statistics even if some of the explanatory variables are endogenous (Sollis and Harris, 2003). However, Pesaran (1997) and Inder (1993) explained that an addition of the dynamics may assist in fixing the endogeneity bias. Secondly, according to Pesaran et al. (2001), the ARDL model generates a reliable long run parameter estimates that are normally assymptotic without regarding the integration order i.e. if the variables are mutually integrated, I(0) or I(1). Third, the

bounds technique is the most appropriate statistical approach to establish small samples co-integration relation (Siddiki and Ghatak, 2001), meanwhile the large data samples are collected for validity through the Johansen co-integration techniques. We constructed an ARDL conditional error correction model, explained below:

$$\Delta lngdpk_t = \alpha + \sum_{i=0}^{n} \beta_{1i} \Delta lnexch_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta oildep_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta lnimp_{t-i} + \sum_{i=0}^{n} \beta_{4i} \Delta lnexp_{t-I} + \sum_{i=0}^{n} \beta_{5i} \Delta lnserv_{t-i} + \Phi ECM_{t-1} + \varepsilon_t \quad (2)$$

The Equation above shows the ARDL model, Φ represents the speed of adjustment coefficient, The *ECM* denotes the error correction mechanism and within a period, it captures the speed at which disequilibrium *in lngdpk* are corrected. For the model to be correcting, stable and co-integrated, the *ECM* coefficient in absolute values must be negatively significant and less than one.

4.5 Stationarity Test

Regressing a non-stationary series results in a spurious regression, therefore the basic assumption regarding time series regression analysis states that the series must be stationary.

Over a period of time a non-stationary time series are often trending, the trend however is not deterministic but rather stochastic. To indicate whether a time series is stationary or not, we consider;

ADF Unit Root Tests

In first stage of the estimation procedure, the stationarity features of the series will be examined. However when dealing with stationary time series, shocks are temporary but over time when the series change back to their long run mean values, the effect

automatically disappears. Meanwhile, non-stationary time series contains permanent components. (Asteriou, 2006).

According to Nelson and Plooser (1982), most economic time series have to be differenced to be static. In fact, many economic variables seem to have trend. Hence, they are non-stationary in most cases. Thus, testing for non-stationarity means checking for the presence of a unit root.

To test for the stationarity of the variables, Dickey and Fuller (1981) proposed Augmented Dickey Fuller test. However, in the case that error terms (ε_t) are correlated, Dickey and fuller constructed the Augmented Dickey Fuller test. Gujarati (2003). The ADF unit root test widely accepted model specification can be written as:

$$\Delta y_t = \alpha_1 + \alpha_2 + \mu y_{t-1} + \delta_t + \sum_{t-1}^{m} \Delta y_{t-1} + u_t \qquad (3)$$

Where:

α_1 - Constant trend or a drift,

α_2 - Time trend parameter,

$\sum_{t-1}^{m} \Delta y_{t-1}$ - Autoregressive process for lag order

ΔYt- The change in variable yt and lag

δ - The unit root

u_t - White noise error term.

ADF test can be with constant and none or constant and trend the ADF hypothesis can be written as:

H_0 : δ= 0 (non-stationary)

H_a : δ< 0 (stationary)

For ADF test proper specification of the model we have to confirm if its a pure random walk variable or the variable is a random walk with time trend and drift trend or random walk with drift trend. Then, we can determine the amount of lags to be included in the model.

Autocorrelation Function and Correlogram

The Auocorrelation function at lagged k isknown as $\rho_k = \gamma_k / \gamma_0$ = covariance at lag k/ variance. We use Schwarz information criteria (SIC) or Akaike information criteria (AIC) to decide the lag length. In addition, we are determining the proper amount of lags to be added in the model.

To compute the standard error for autocorrelation function and correlogram is to examine the statistical significance of each autocorrelation coefficient in the correlogram, Q-value will be used from the Q-statistics as follows.

$Q= n \sum_{k=1}^{k=m} \rho \wedge_k^2 (4)$

Where;

n is the sample size and m is the number of lags (=df)

H_0 : time series is stationary

H_a : time series is non-stationary

4.6 Bounds Co-integration Test

Pesaran et al. (2001) developed a bounds testing technique which is employed when we are not certain if the variables are of the same order i.e. I(0) or I(1) or I(2). This procedure is used to check the existence of relationship among the variable in the long run and it is in accordance with the F-test. Written:

Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

The variables are not co-integrated

Ha: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$

The variables are co-integrated

We apply the F-test with a non-standard asymptotic distribution when the explanatory variables are $I(d)$ with $0 \leq d \leq 1$ i.e. Two bounds asymptotic critical values are used to determine the co-integration test. The upper bound assumes that all the regressors are I (1), and the lower bound assumes they are I (0). The null is rejected, if the estimated F-statistics lies on the upper plain of the band, showing the presence of co-integration (Pesaran, 1997). The null hypothesis will not be rejected, if the estimated F statistics lies under the lower level of the band, indicating the absence of co-integration. However, the assumption would be inconclusive, if the statistics lies within the band.

Chapter 5

RESULT AND FINDINGS

5.1 Unit Root Tests

Prior to the implementation of the ARDL technique, regressing a non-stationary time series results to misleading inferences (Libanio, 2005), therefore all variables must be tested for stationarity. The unit root test is used to verify the integration order and it is an essential requirement for the presence of co-integration (Nelson, John and Reetu, 2005). To investigate the existence/absence of unit root in each variable we use the ADF test, thereby determining the integration order. We can now specify the long run linkages by choosing the integration order for each variable i.e. I(0) or I(1).

Table 1: Result for the Unit Root Test

Variables	**I(0)levels**	**I(1)first difference**	**Integration Order**
Oildepp	Reject H_0	Reject H_0	I(0) ***
Lngdpk	Cannot reject H_0	Reject H_0	I(1) ***
Lnexpts	Cannot reject H_0	Reject H_0	I(1) ***
Lnserv	Cannot reject H_0	Reject H0	I(1) ***
Lnexr	Cannot reject H_0	Reject H_0	I(1) ***
Lnimpts	Cannot reject H_0	Reject H_0	I(1) ***

From Table 1 it can be seen that all the variables were integrated of order one I (1) except for oil dependence which was integrated of order zero I (0), However this is not a problem because the ARDL model accommodates different integration order of variables as long as when the variable goes through the procedure of bounds testing, the no co-integration null can be rejected.

5.2 Bounds Co-integration Test

To test the presence of a long-run relationship among the variables, the bounds testing technique developed by Pesaran, et al. (2001) will be applied. Two bounds asymptotic critical values are used to determine the co-integration test. The upper bound assumes that all the regressors are *I* (1) and the lower bound assumes they are *I* (0).The bounds testing technique is based on the F-test. However the F-test is a test of the hypothesis of the presence of co-integration among the variables against the absence of co-integration among the variables denoted as:

Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

The variables are not co-integrated

Ha: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$

The variables are co-integrated

This is donated as:

$$F_{lngdpk}(lngdpk \mid loildep,\ lnexch,\ lnexp, lnserv, lnimp).$$

Table 2: Bounds Testing For Co integration

Test Statistic	Value	K
F-statistic	6.360403	5

Critical Value Bounds

Significance	I(0)Bound	I(1)Bound
10%	2.75	3.79
5%	3.12	4.25
2.5%	3.49	4.67
1%	3.93	5.23

In Table 2 the result shows that all the variables are co-integrated. Therefore the no co-integration null is rejected, as the calculated 6.36 F statistic is greater than the upper bound critical values. Once we confirm that a long-run co-integration relationship exists. The next stage, the variables were estimated using Schwartz Bayesian criteria to determine the appropriate lags and the criteria chooses 2 lags. Then we estimate the ARDL short run and the long run relationship between the coefficients.

Table 3: ARDL Model Estimated Long Run Coefficients

Co-integrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OILDEP)	0.001652	0.000690	2.392441	0.0257
D(OILDEP(-1))	0.003308	0.000755	4.382280	0.0002
D(OILDEP(-2))	0.001117	0.000761	1.467106	0.1565
D(LIMP)	0.029860	0.024919	1.198298	0.2436
D(LEXCH)	-0.039257	0.023907	-1.642029	0.1148
D(LEXCH(-1))	-0.010744	0.029952	-0.358692	0.7232
D(LEXCH(-2))	-0.065872	0.023187	-2.840902	0.0095
D(LSERV)	0.781679	0.097822	7.990829	0.0000
D(LSERV(-1))	-0.300540	0.093802	-3.203995	0.0041
D(LEXP)	-0.039033	0.032108	-1.215678	0.2370
D(@TREND())	-0.017875	0.004926	-3.628550	0.0015
CointEq(-1)	-0.498155	0.132984	-3.745988	0.0011

Cointeq = LGDPK - (-0.0083*OILDEP + 0.0599*LIMP + 0.0787*LEXCH + 0.6109*LSERV-0.0784*LEXP -6.5391-0.0359*@TREND)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OILDEP	-0.008280	0.002424	-3.416424	0.0025
LIMP	0.059941	0.038795	1.545079	0.1366
LEXCH	0.078692	0.038417	2.048381	0.0526
LSERV	0.610935	0.091040	6.710594	0.0000
LEXP	-0.078356	0.058700	-1.334849	0.1956
C	-6.539101	1.806663	-3.619436	0.0015
@TREND	-0.035883	0.009164	-3.915742	0.0007

From Table 3 the exchange rate coefficient is statistically significant at the 10% level and for the services sector was significant at the 1% level. The p-values are below 0.05. Thus, null hypothesis (H0) is rejected. Import and export however were not significant but import had a positive relationship while export was negatively related with the GDP per capita. In addition, the importation implies capital outflow but the effect of the capital outflow is mitigated by the foreign exchange coming from oil,

therefore there is no relationship in the long run. Thus import might be endogeneous. Nevertheless, the positive relationship of import may also be because of the endogeneity when there is an economic boom or a rise in GDP and thus positive relationship between import and GDP might imply causality running from GDP to imports. However, the export is negative and insignificant; this may be because about 90% of Nigerian export is crude oil based. This is in line with Ovikuomagbe et al. (2013), who also found an insignificant negative relationship between oil export and per capita GDP. It can also be seen that in the long run a negative significant relationship exist between oil dependence (OILDEP) and per capita GDP, this is due to the volatility of terms of trade. This is in accordance with the result obtained by Olomola P.A (2007) and Sachs and Warner (1995, 1997). This implies that a unit standard deviation expansion in Oil rents ratio to GDP (OILDEP) will bring about a reduction in GDP per-capita by 0.008 percentage points in the long run, holding other factors constant and this is at the 1% level of significance. Service sector has a positive significant relationship with GDP per-capita as a 1% expansion in services sector leads to about 0.6% increase in GDP per-capita in the long run, holding other factors constant. The positive significant relationship is due to the indirect industrialization were by resources and funds move from the manufacturing, agricultural and the oil sector to the services sector, which gains more spending effect from a boom in oil sector in the long run. Therefore a boom in oil sector strengthens the services sector; therefore in the long run the volatility of the oil prices will have no significant effect on the services sector. The real exchange rates had a positive and significant relationship with real per capita GDP. Ceteris paribus, a one percent increase in real exchange rate brings about 0.07 percent increase in per capita real GDP.

5.3 ARDL-ECM– Short Run Dynamics

Table 4.Error Correction

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OILDEP)	0.001459	0.000669	2.179608	0.0403
D(OILDEP(-1))	0.004146	0.000923	4.493972	0.0002
D(OILDEP(-2))	0.001081	0.000779	1.387549	0.1792
D(LEXCH)	-0.042262	0.022919	-1.843964	0.0787
D(LEXCH(-1))	-0.080892	0.021883	-3.696523	0.0013
D(LEXCH(-2))	-0.056976	0.022853	-2.493164	0.0207
D(LSERV)	0.754143	0.093278	8.084934	0.0000
D(LSERV(-1))	-0.295606	0.096246	-3.071358	0.0056
C	-3.048246	1.274278	-2.392137	0.0257
@TREND	-0.018256	0.005123	-3.563720	0.0017
OILDEP(-1)	-0.003970	0.001011	-3.927589	0.0007
LIMP(-1)	0.021958	0.021409	1.025667	0.3162
LEXCH(-1)	0.045540	0.014591	3.121121	0.0050
LSERV(-1)	0.282763	0.085597	3.303410	0.0032
LEXP(-1)	-0.032092	0.032652	-0.982860	0.3364
LGDPK(-1)	-0.451382	0.116164	-3.885733	0.0008
ECM(-1)	-0.855630	0.003691	3.415740	0.0025

R-squared	0.897926	Mean dependent var	0.007291
Adjusted R-squared	0.828330	S.D. dependent var	0.071493
S.E. of regression	0.029622	Akaike info criterion	-3.905052
Sum squared resid	0.019304	Schwarz criterion	-3.215542
Log likelihood	90.19598	Hannan-Quinn criter.	-3.659729
F-statistic	12.90202	Durbin-Watson stat	2.484095
Prob(F-statistic)	0.000000		

From table 4 it can be seen that the model has a good fit as the R-squared value is 0.89, which implies 89% of variability in GDP is explained by the variables. A significant positive relationship was discovered between oil dependence and per capita GDP in the short run. The coefficient on services was however ambiguous. The exchange rate coefficient is negatively related with GDP in the short run. The *ECM* has a negative and a significant coefficient, which implies that 85% deviation in *LGDPK* from its equilibrium level (co-integrating values) is fixed within a period.

Chapter 6

CONCLUSION AND POLICY RECOMMENDATION

6.1 Conclusion

The paper investigates the relationship between oil dependence and per capita GDP for Nigeria by applying the ARDL bounds testing approach to co-integration and using annual data time series from 1973-2013. Conclusively oil dependence presents a negative significant effect on the economy and this effect is transmitted from the exchange rate to the balance of payment, down to the manufacturing sector. The manufacturing sector remains impeded because the government cannot sustain a single productive developmental strategy due to the high level of dependence on volatile oil price, making diversification more challenging to implement. Import and export however were not significant but import had a positive relationship while export was negatively related with the GDP per capita, this is due to the complete reliance on oil revenue. In addition, the importation implies capital outflow but the effect of the capital outflow is lessened by the foreign exchange coming from oil, therefore there is no relationship in the long run. Thus import might be endogenous. Nevertheless, the positive relationship of import may be because of the endogeneity when there is an economic boom or a rise in GDP and thus positive relationship between import and GDP might imply causality running from GDP to imports. Based on the empirical result, the services sector equally has a significant and positive relationship with the growth of the economy and this is due to the indirect industrialization were by productive resources and funds move from the

manufacturing and agricultural sector to the services sector which gains more spending effect from a boom in oil sector in the long run. A boom in oil sector strengthens the services sector. As such it will gain the effect of spending that is prompted by the boom in the oil sector because of the substitutability in imports. Domestic demand will increase by the spending effect although it would lead to a reduction in the agricultural goods production due to the crowding out effect

6.2 Recommendation

Looking at the current global fall in oil prices, in order to be less dependent on crude oil for economic sustainability, it is now essential for Nigeria to diversify its sources of foreign exchange earnings.

In order to diversify the economy, the need to adjust the non-oil tax revenue as a source of sustainable revenue for development should not be underestimated.

Federal government should use excess crude oil account (ECA) efficiently in this time of crisis. The funds should be used to finance critical infrastructure for long term development and growth.

Another most important recommendation of this study is that government should come up with policies that would encourage the private sectors to actively participate in the non-oil sectors (telecommunication, whole sale & retail trade and real estate sector), expansion of Foreign Direct Investment and sterilization of oil rents overseas by fostering incentives so as to reduce the oil price shocks and the negative effects of crude oil prompted capital inflow in the Nigeria's economy.

Also an adjustment policy should be implemented to tighten the government expenditure and shore up the non-oil incomes so as to compensate for diminishing oil revenues.

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