Dutch disease or Nigerian disease: a prima facie? New evidence from ARDL bound test analysis

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Abstract

It is somewhat paradoxical and counter intuitive that an increasing stock of assets in a country tend to hinder its economic growth rather than bringing about greater opportunities for economic development. This is termed "resource curse". While many refers to it as Dutch disease, where an economy whose original exports were tradable goods, but then shift to export of booming sector, which consequently leads to a real exchange rate appreciation and the extinction of the original tradable goods exporting sector. Others refer to it as the Nigerian disease where an abundance of natural resources leads to poorer governance and conflicts, which brings about a decline in economic progress. This study, using Nigeria as a case study, employs autoregressive distributed lag (ARDL) approach to co-integration proposed by Pesaran et al. (2001). It is based on a time series data over the period 1981–2014. This study extends existing literature by focusing on the institutional quality as an influential phenomenon in economic growth. The findings diagnose Nigeria to be suffering more from the Nigerian disease which is attributable to institutional quality (i.e., corruption) than Dutch disease attributable to foreign exchange. This implies that the government should strive towards long term economic development and diversification by enhancing, among others, its institutional quality and combating corruption.

Key words: Dutch Disease, Exchange rate, Oil revenue, Agriculture, Nigerian Disease, ARDL, Corruption

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Introduction

Based on the conventional economic rationale, an increasing stock of assets in a country brings about greater opportunities for economic growth. However, its becomes a paradox when a substantial body of empirical evidence demonstrates that natural resources tend to hinder economic growth rather than promoting it. According to J D Sachs & Warner 1997, 2001), in their seminal studies, after controlling for a wide variety of variables, an increase of one standard deviation in natural resource intensity leads to a reduction of about 1% per year in economic growth. This result has been termed ‘‘resource curse,’’ and has subsequent inspired a large volume of empirical research.

According to Benkhodja (2014), The term “Dutch Disease” was first used to depict the fear of death of manufacturing in the Netherland economy when natural gas was discovered in the 1960s. The Dutch disease theory was developed after the Netherlands found large sources of natural gas in the North Sea in the 1960s. Large capital inflows from increased export revenues caused demand for the Dutch florin to rise, which, in turn, led to an appreciation of the Dutch exchange rate. This appreciation made it difficult for the manufacturing sector to compete in international markets (Benkhodja, 2014). However, some Economies have survive this situation such as Norway, instead diversify their economy.

Diversification which is all about the exploitation and development of various sectors of an economy if not all sectors, has been a major route through which many developed countries of the world passed (Bature, 2013). Instead of diversification, governments are rather induced into corruption and wasteful spending, weak investments, nonchalant attitude towards reinvesting the excess income from their booming single sector thereby, creating a decline or total collapse of economic activities in other sectors of their economies. This was the situation in the Netherland where the discovery of a large natural gas reserve led to a decline in its industrial base owing to inflationary pressure on the guilder. The phenomenon created unemployment in the Netherland through a massive movement of workers from the manufacturing sector to the booming gas sector for higher pay. This action later killed their manufacturing sector.

Nigerian Disease

The Nigerian Disease is another another explanation of the resource curse by recent studies. It shows that abundance of natural resources leads to poorer governance and conflicts. It gives rise to governments that are less accountable to the people, have little incentive for institution-building, and fail to implement growth enhancing reforms. Higher corruption, more rent-seeking activity, greater civil conflict, and erosion of social capital are some of the outcomes associated with the Nigerian Disease (Rosser, 2006).

Nigeria has, in recent times, been referred to as the fastest growing economy on the African continent and one of the 10 fastest growing economies in the world. Ironically, the country also harbours some of the poorest people in the world with as many as 69% of the population, which is about 112.47

million Nigerians, living below the poverty line (NBS, 2010). Given the country's enormous resources, it is puzzling that such a huge portion of the populace lives in poverty. This vast incidence of poverty in the midst of plenty has severally been linked to the endemic corruption in the country, as it involves the massive stealing of resources that would have otherwise been invested in providing wealth-creating infrastructure for the citizens.

In the case of Nigeria, the Former president Olusegun Obasanjo (1992:2) explained that;

> "While Indonesia had oil in part to finance its investment in agricultural development and to use it as jump of leverage, Malaysia was not blessed with the same gift of nature. Yet the story has been told so often of how Malaysia came in the sixties to collect palm oil seedlings from Nigeria. The irony of it is that while Malaysia is currently an exporter of palm oil, Nigeria is now an importer of palm oil and importing from Malaysia."

This explains the story of declining agriculture in Nigeria as a result of concentration on a single sector (oil) for everything. The situation became more and more difficult, when rising bills from imported food and industrial machines that made Nigeria became more and more dependent on oil. An intriguing question that cross our mind is "how long can Nigeria sustain its self especially being the most populous country in Africa?

The danger of depending on a single sector began to manifest when Nigeria began to produce less than 1 million barrels of petrol daily and sold it for about $30 per barrel as against an earlier 2.5 million barrels per day in 1979 and at a tagged price of $40 per barrel(FGN1983). Many countries of the world has suffered from similar situation due to dependence on single growing sectors"(Bature, 2013). The concentration of economic activities on a single sector can only cause more hardship and take a country backward. The leaders under excessive wealth and riches looses bearing due to such sudden financial power and end up calculating ways to spend such accumulated wealth.

This study attempts to imbibe the industrial situation in Netherland (Dutch disease) to the Nigerian agricultural setting, while evaluating it against the Nigerian Disease (Institutional quality). Therefore, this study aimed at examining the impact of the Petroleum export sector and institutional quality on the traditional agriculture export sector. This similar to the study of Bature, (2013) but differ with our special consideration of institutional quality (Corruption) which captures the Nigerian Disease factor.

This study employs yearly data over the period 1982 -2014 by using a robust and advanced time series technique, Autoregressive Distributed Lag (ARDL) co-integration method which is applicable regardless whether the variables are I(1) or I(0). It captures co-movements which may not be identified in other univariate or bivariate models and separately examines an ECM mechanism to track the short run dynamics. Also we apply the VAR impulse response model, which is ideal to simulate hypothetical macroeconomic shocks. It was employed to capture the accumulated response of agriculture value added as a share of GDP to macroeconomic variable shocks in the economy.

Our findings unearthed an interesting result which indicate contrary to the conventional perception that resource course is determined only by appreciation in exchange rate due to natural resource (Oil) price increase. The finding depicts that Institutional quality impacts more on the resource course phenomena. In other words, Nigeria is diagnosed to be suffering more from the Nigerian disease than the Dutch disease. Evidence from impulse response shows that Agriculture responds more to the

shock in Corruption than real exchange rate and oil revenue.

The remainder of the study is organized as follows. Section 2 presents the literature review. Section 3 contains an overview of Dutch disease and the Nigerian economy. Section 4 presents the methodology used to investigate the causality links between the variables. Then, the empirical findings have been presented and analyzed in section 5. Given the obtained results, policy implications are provided in Section 6. Section 7 concludes our study.

Literature Review

Dutch disease theory has been a subject of abundant theoretical literature since the beginning of the 80s. It has been developed in a partial equilibrium framework and can be presented in two forms: the spending effect and the resource movement effect. Both effects lead to a decline of the tradable sectors; Agriculture and manufacturing sector. This decline occurs because of the fall of output in this sector.

Indeed, if the oil supply is not perfectly inelastic, a rise of oil price leads to an increase of the demand of labor and capital in the oil sector and increases wages and capital return in this sector. If the production factors are mobile, capital and labor will move from the manufacturing sector to the oil and service sectors which will cause de-industrialization. There are two main mechanisms by which the oil shocks affect the economic activity: the spending effect and the resource-movement effect. These effects are the essential components of the Dutch disease theory.

Theoretical Background

According to Bature (2013), The history of Dutch disease dates back to the late 1950s when the Netherlands discovered a large natural gas resource in the north of the country and rapid development of the resource began in 1963. Since then some new finds have been made both onshore and offshore. By the 1970s, what was originally a natural gas importing country started to export gas and by 1976, which represented a peak year for natural gas exports, it exported about 51 billion cubic metres or about 44 million tonnes of oil equivalent (mtoe). In addition, massive long-term export contracts were drawn up, with prices linked to the price of oil. The balance of payments current account benefited accordingly. Apart from natural gas earning foreign exchange to the Netherlands as a result of increased exports, it also made a significant contribution to the national budget ((Arreaza, Castilla, & Fernandez, 1984;Kremers 1985).

Dutch Disease implies that the exchange rate has appreciated as a result of a new natural resource which greatly augments the country's foreign exchange earnings. A large inflow of foreign exchange and a large balance of payments surplus in most oil exporting countries causes the domestic currency to appreciate, and the oil-based rate to be higher than desirable for the non-oil sectors, with a harmful impact on the competitiveness of domestic production and the objective of diversification. The first paper credited on the resource boom paradox was that of Meade and Russel (1957) but the core model of the theory of Dutch disease today can be seen in the studies of Corden and Neary (1982).

The Classicalists embrace the theory of Dutch disease, problems of rent-seeking and explanation of political-economy (Corden & Neary, 1982; Rodríguez & Sachs, 1999; Van Wijnbergen, 1986). The cause and effect of Dutch disease in resource-rich nations was examined by Rodríguez & Sachs (1999), who noticed that over-shooting of levels of consumption lead to movement towards the stationary state and result in slow growth.

The political economy literature often argues that abundant natural resource revenues lead to poor spending policies. The idea is that "easy" revenues corrupt and bring about conflicts (Ross 1986), and encourage economically inefficient, but politically important projects. To mitigate such problems, Sala-i-martin & Subramaniana (2003), suggest decentralizing revenues for the case of Nigeria, by distributing them directly to the people, so the government is forced to finance public services by taxes. Yet only a limited number of theoretical studies have tried to explain a diverging experience in resource impact on economic performance, an exception being (Mehlum, Moene, & Torvik, 2006).

Empirical Underpinnings

Stjns (2003), using a dynamic multi-sectoral general equilibrium model, found that a surge of oil revenues leads to a real appreciation. Imimole et al (2011) discovered that a country always witnesses real exchange rate appreciation when its nominal rate is pegged and inflation is high. It is mostly reversed by devaluing the nominal exchange rates. Vanwijnbergen (1984), pointed out that under a fixed exchange rate regime the inflation spiral is the main driver of exchange rate appreciation whereas the catch-up movement in stability is driven by periods of flexible exchange rates.

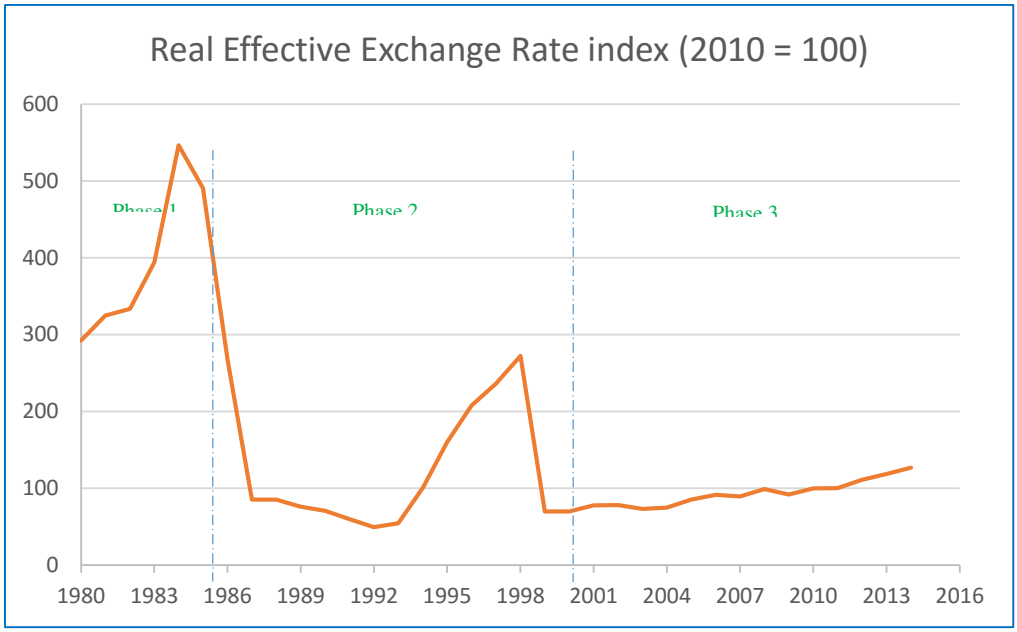
Ross (1999), examined the Dutch disease symptoms in the case of the United Kingdom. According to him, after the commercial exploitation of crude oil in 1975, the RER appreciated by about 10 percent between 1973 and 1982, and this led to a fall in manufacturing output in the United Kingdom. This was also established by Forysth (1985) who confirms that there is evidence of Dutch disease in the UK. However, he affirms that the specific effect of the booming sector (energy) cannot be measured by structural movements of the economy.

In the case of less developed economies, Warr (1985) thought that the conclusion about the structure of the economy being affected was not clear, but the energy sector boom had unique effects on domestic prices in Indonesia. However, Roemer (1994) confirms that the Indonesian government, through careful exchange rate management, escaped the impacts of the Dutch disease. This shows that the effect of Dutch disease in Indonesia was rendered insignificant through prudent management of exchange.

Dutch Disease and Nigerian Economy: Exchange Rate Regimes

According to Bature (2013), the Nigerian economy like some other low income countries of the world from her political independence in 1960 has been using a fixed exchange rate system which entails the pegging of the exchange rate of the Nigerian domestic currency (Naira) to a reference currency (British pound sterling). This was to ensure a low rate of inflation and for proper management of the Nigerian exchange rate but when British pound sterling was floated along the line; the Nigerian Naira became a pegged currency to the American US Dollar. Nigeria shifted from fixed to "controlled/managed" flexible exchange rate system (where there was the official exchange rate and the black market rate) in July, 1986 following the advice of IMF on restructuring the Nigerian economy through Structural Adjustment Programme and economic liberalization due to economic mal-functioning in the early 1980s and not until 1999 a more flexible exchange rate was not introduced to Nigerian economy. The control of the foreign exchange market through visible hand was totally removed in 1999 and the forces of demand and supply determine the exchange rate ever since then (a more pronounced market regulated system). The different phases of exchange rate are demonstrated in Figure 1.

Figure 1: Real Effective Exchange Rate in Nigeria 1980–2014

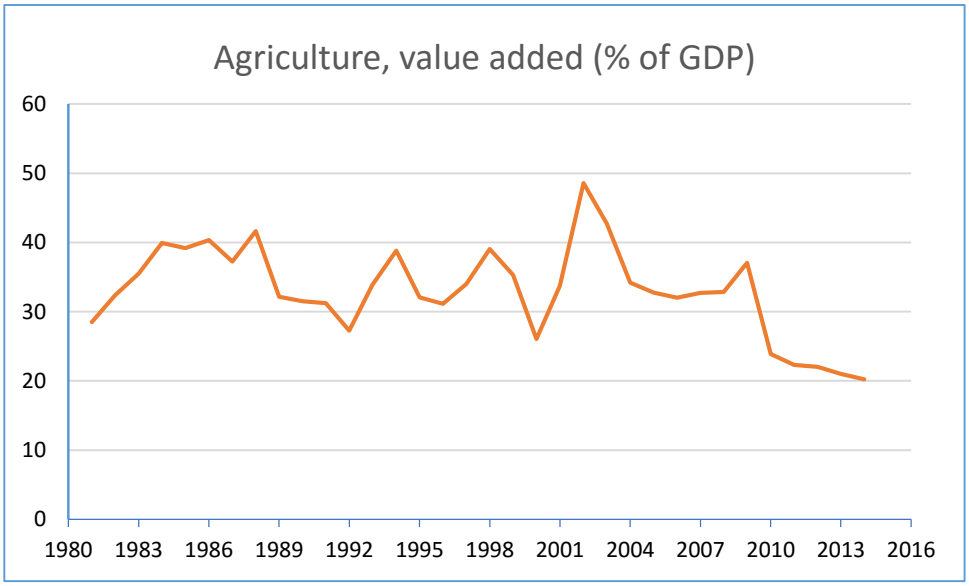


Source: International Monetary Fund, International Financial Statistics, 2015.

Role of Agriculture in Nigeria Economy

The Nigerian economy prior to independence was epitome of an agrarian economy. it relied on agricultural products for consumption, employment, foreign exchange earnings and domestic savings. From Figure 2, agriculture takes about 65 per cent share of the real GDP signifying the importance of agriculture in the economy at that period.

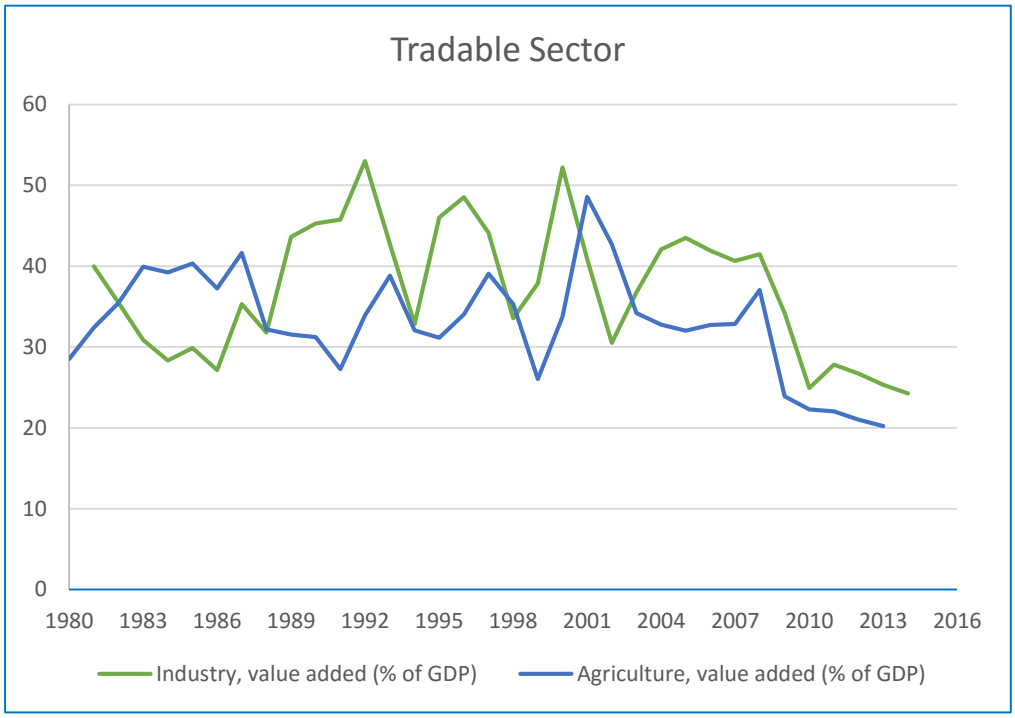
Figure 2: Agriculture as percentage of Real GDP



Source: World Development Indicator (World Bank, 2015)

Agricultural sector at independence made it possible for the economy to cut down her importations on some major economic activities making the exchange rate stability effective. The contribution of agriculture to GDP was very high from independence till the mid-1970s and agricultural exports remained the backbone of the Nigerian economy and provided a significant proportion of foreign exchange earnings.

"In their own contribution, Omowale and Rodrigues (1979) opined that for most developing countries agriculture has been assigned an important role in national development. To them agriculture has been seen as a means of reducing dependence on certain imports, and a way to control food price increases, earning foreign exchange, absorbing many new entrants to the labour market and increasing farm incomes at times of severe unemployment and rural poverty" (Anyawu (1997:pp12).)



Crude-Oil and the Exchange Rate in Nigeria

"There is virtually no exchange rate system that Nigeria has not tried in order to find the 'realistic' exchange value for the Naira" (Adedipe, 2004). The different exchange rate regimes in Nigeria can be classified into different epochs relating to the vagaries of the international oil market.

The Post-Independence Era (1960-1971)

Like some other low income countries of the world, after political independence in 1960, the Nigerian economy used a pegged rate system, where the Nigerian (Pound) was pegged to the British Pound (as can be seen in Figure 1). During this period, the Nigerian Pound was pegged at par to the British Pound Sterling (GBP), using administrative measures to sustain the parity. The devaluation of the GBP in 1967 coupled with its being floated in 1972 forced Nigeria switch to a US Dollar, which was deemed better able to develop Nigeria's import substitution industries. During this period the fiscal balance was in surplus for most of these years, inflation rate averaged about 5 percent and the Current Account Balance was in surplus. This period is captured by Part A Phase I of the exchange rate system (Figure 1).

The 'Oil Boom' Era (1972-1986)

The oil boom is Part B of the Phase I of the exchange rate system (Figure 1 above). During this period, the exchange rate mirrored movements in oil prices and the naira remained strong as a result of the huge increase in foreign exchange earnings. The currency was pegged to US Dollar in 1972. This was abandoned between 1974 and 1976, when an independent exchange rate management policy that pegged the naira to either the US dollar or the British pound sterling was put in place and a policy of gradual appreciation of the naira was pursued. The huge earnings from crude petroleum export over this period allowed Nigeria to run persistent external surpluses in the balance of payments, which supported the appreciation of the naira (Bature, 2013).

This period was the beginning of Dutch Disease in Nigeria. The strong exchange rate that followed helped to cheapen imports of competing food items as well as agro-based and industrial raw materials, which led to rapid expansion in the importation of these goods to the detriment of local production of similar goods. Aggregate import demand later outstripped total foreign exchange available for import and trade restrictions though an import licensing scheme was introduced. A policy reversal was effected in the management of the naira exchange rate towards the latter part of 1976: this was a deliberate policy to depreciate the naira, although it was not systematic. However, in 1978, the naira was anchored on a basket of 12 currencies of Nigeria's major trading partners. This was jettisoned in 1985 and the naira reverted to anchored against the US dollar.

The Post-Sap Era (1986 till 2010)

The last exchange rate period in Nigeria began in 1986 (see figure 1). A major policy reversal was effected in September 1986 when the fixed exchange rate regime had to be discarded and a flexible exchange rate regime was put in place following the advice of the IMF on restructuring the Nigerian economy through the Structural Adjustment Programme (SAP).

With the adoption of SAP, foreign exchange allocation and import licensing procedures were abolished and transactions in foreign exchange were subjected to market forces under an auction system. The naira was subjected to a managed float in a continuing effort to restructure the economy away from oil dependency. The policy of deregulation of the foreign exchange market in 1986 was aimed at establishing the market exchange value of the naira. The hope was to boost non-oil exports and reduce the dependence on crude petroleum exports.

As noted by Honohan and Lane (2003), exchange rate depreciation had resulted in the dramatic increase in the naira price of imports, which should have discouraged imports. However, it was not until 1999 that a more flexible exchange rate was again introduced to the Nigerian economy. The visible control of the foreign exchange market was totally removed in 1999 and a more pronounced market regulated system was introduced

Corruption and the Nigerian Economy

Given the country's enormous resources, it is puzzling that such a huge portion of the populace lives in poverty. This vast incidence of poverty in the midst of plenty has severally been linked to the endemic corruption in the country, as it involves the massive stealing of resources that would have otherwise been invested in providing wealth-creating infrastructure for the citizens.

This perception is reinforced by an accepted position that corruption is a global incidence that tends to retard the growth of countries where it manifests. Corruption is also taken as having the tendency to exacerbate and cause con icts, promote poverty, and impact negatively on the best use of human and natural resources. Some previous studies have shown that corruption remains a major hindrance to the achievement of the Millennium Development Goals (Transparency International, 2010; World Bank, 2010).

The governance model contends that corruption affects poverty in the sense that increased corruption reduces governance capacity (otherwise understood as the institutional capacity of government to deliver quality public services). A study by ActionAid Nigeria, (2015) examined the link between these two phenomena in Nigeria. During the study, it was found evidence that in Nigeria, corruption has a profound impact on the level of poverty due to the resulting failure by the government to use

resources to deliver poverty-reduction services.

Corruption is widespread in the different tiers and arms of governments and the private sector. It manifests in various forms and in many types of transactions within and across levels of governments, within and between private enterprises of different types and scales of operations, between principal actors in private and public sectors, and within civil society organisations. Although corruption may appear to be pervasive, it is important not to lose sight of the fact there are key drivers who not only enabled and profit from corruption but who are determined to ensure that efforts to fight corruption do not succeed. Some of the key drivers of corruption in the country are Officials in the Executive Arm, legislature, judiciary, the private sector, oil and gas sector, banking sector among others.

Methodology

4. 1 Data and Model Theoretical Specification

This study examines Dutch disease in the case of Nigeria by applying the Autoregressive Distributed Lag model (ARDL) analysis (also known as the Bounds testing procedure) by using Seven variables based on previous studies and our research objective, a number of variables as potential determinants have been divided into three major categories namely, Dependent, Relative price Effect (cite..papr) and Institutional quality.

The Relative price variables refer to Real Exchange rate, (cite..papr) Oil revenue (Product of Oil Production and OPEC Oil prices) (cite..papr). While Corruption Index measures the Institutional Quality (cite). In addition to that we have three control variables, Money Supply, Manufacturing Output (%GDP) and Fixed Gross Capital (%GDP). In this context, theory asserts that countries that have stable revenue from increasing oil prices will result in appreciation in exchange rate and subsequent decline on other sectors. In this study, variable that represent external shock to the economy, namely exchange rate is examined.

Theoretical Model Specifications

The model tests if Dutch Disease measured by AGD as a function of the relative price variable, institutional quality and Control variables. The empirical model is given by:

$$\mathrm{AGD} = \int (\mathrm{ORV}, \mathrm{RER}, \mathrm{M2}, \mathrm{AGD}, \mathrm{MGD}, \mathrm{FCG}, \mathrm{CPT})$$

Equation 1: Theoretical Model Specification

Where,

ORV = Oil Revenue (Product of output

RER = Real Exchange Rate

M2 = Money Supply

AGD = Agricultural Production (%GDP)

MGD = Manufacturing Output (%GDP)

FCG = Fixed Gross Capital (%GDP)

CPT = Corruption index

Annual time series data was collected for the period 1982 to 2014. A total of 32 observations were obtained. Due to longer duration of the series and many missing values we have to use multiple sources for collecting data for all variables used in the study.

Variables	Type	Explanation	Expected Sign
AGD	Dependent	Agricultural Production (%GDP)	
RER	Dutch disease: Relative Price Effect	Real Exchange Rate	Positive
ORV	Dutch disease: Relative Price Effect	Oil Revenue (Product of output	Positive
CPT	Institutional Quality	Corruption index	Positive
MGD	Control	Manufacturing Output (%GDP)	
FCG	Control	Fixed Gross Capital (%GDP)	
M2	Control	Money Supply	

4.2 Time Series Techniques

Methodology

The ARDL co-integration approach is used first for testing the presence of a long term relationship with the lagged levels of the variables. It helps in identifying the dependent variables (endogenous) and the independent variables (exogenous) which are called the 'forcing variables".

More so, if there is a long term relationship among the variables, then the ARDL analysis generates the ECM equation for every variable, which provides information through the estimated coefficient of the error correction term about the speed at which the dependent variable returns back to equilibrium once shocked.

In regard to the time-series studies, the regression analysis that has been applied for many decades to estimate the long-run relationship among economic and social variables is now considered to have either estimated a spurious relationship (if the original 'level' form of the variables was non-stationary) or estimated a short-run relationship (if the variables were 'differenced' to make the original variables stationary). The damaging limitation of the traditional regression analysis (i.e., either spurious or not testing theory) has been addressed by the recent and ongoing co-integration time series techniques. The significant contributions made by the time series co-integration techniques starting with the publication of the seminal paper by Engle and Granger (1987) has been recognized through the recent award of the Nobel Prize in Economic Science to Engle and Granger in 2003.

Although the conventional co-integrating procedure has made vital advancement on regression analysis by focusing on the point that any regression analysis should start off, not mechanically, but by testing the stationarity and co-integration properties of the time series involved, the co-integrating estimates also are subject to a number of limitations (Masih et al., 2008). The estimates derived from the co-integrating tests (such as the Johansen test) and the unit root tests (such as, the augmented Dicky-Fuller and Phillips-Peron, etc. which precede the co-integrating tests), are found to be biased. The tests lack power and are biased in favour of accepting the null hypothesis. The co-integration tests require the variables to be I(1) but the order of integration of a variable, whether I(1) or I(0),

may depend on the number of lags included or whether the intercept and/or the trend are included or excluded in the unit root tests. Moreover, the Johansen co-integrating tests have small sample bias and simultaneity bias among the regressors.

The Auto-Regressive Distributive Lag (ARDL) method (also known as the bounds testing approach) proposed by Pesaran-Shin-Smith (2001) that we have employed is free from the above limitations of the unit root and co-integration tests. The ARDL bounds testing approach does not require the restriction imposed by co-integration technique that the variables are I(1) or I(0). According to Masih 2009, the bounds testing procedure employed in this study is robust for small sample size study (Pattichis, 1999; Mah, 2000; and Tang and Nair, 2002). Pattichis (1999) applied ARDL bounds test with 20 observations, whereas studies of Mah (2000) and Tang and Nair (2002) had observations of 18 and 28 respectively. Furthermore, the bounds testing approach is possible even when the explanatory variables are endogenous (Alam and Quazi, 2003).

The standard ARDL technique has two stages. First, investigation of the existence of a long-run relationship among variables. This is done by constructing an unrestricted error correction model (VECM) with each variable in turn as a dependent variable and then testing whether or not the 'lagged levels of the variables' in each of the error correction equations are statistically significant (i.e., whether the null of 'no long run relationship' is accepted or rejected).

Basically, the ARDL method is the Wald test (F-statistic version of the bounds testing approach) for the lagged level variables in the right-hand side of VECM. That is, we test the null hypothesis of non-co-integrating relation (Ho: $b_1= b_2= b_3=...= b_n=0$) by performing a joint significance test on the lagged level variables. The asymptotic distribution of the F- statistic is non-standard under the null hypothesis of no co-integrating relation between the examined variables, irrespective whether the explanatory variables are purely I(0) or I(1).

The test consists of computing an F-statistic testing the joint significance of the 'lagged levels of the variables' in each of the above error-correction form of the equation. The computed F-statistic is then compared to two asymptotic critical values. If the test statistic is above an upper critical value, the null hypothesis of 'no long-run relationship' can be rejected regardless of whether the variables are I(0) or I(1). Alternatively, when the test statistic falls below a lower critical value, the null hypothesis of 'no long-run relationship' is accepted regardless of whether the variables are I(0) or (1). Finally, if the test statistic falls between these two bounds, the result is inconclusive. It is only in this case that the researcher may have to carry out unit root tests on the variables. As regards the implications of the F-statistics, if all the F- statistics in all equations happen to be insignificant, then that implies the acceptance of the null of 'no long run relationship' among the variables. However, if at least one of the F-statistics in the error- correction equations is significant, then the null of 'no long-run relationship' among the variables is rejected. In that case there is a long run relationship among the variables. When the F-statistic is significant, the corresponding dependent variable is endogenous and when the F-statistic is insignificant, the corresponding dependent variable is exogenous or called 'long-run forcing variable'.

Once the long run relationship has been demonstrated, the second stage of the analysis involves the estimation of the long run coefficients (after selecting the optimum order of the variables through AIC or SBC criteria) and then estimate the associated error correction model in order to estimate the adjustment coefficients of the error-correction term. Since the data are yearly, we choose one for the maximum order of the lags in ARDL model. Since the observations are yearly, for the maximum

order of the lags in the ARDL model we choose 1 and carry out the estimation over the period of 1982 to 2014.

The ARDL model specifications of the functional relationship between Agricultural Production as %GDP (AGD), Oil Rent (ORV), Real Exchange Rate (RER), Money Supply (M2), Manufacturing Output as %GDP (MGD), Gross Fixed Capital as %GDP (FCG) and Corruption index (CPT) can be estimated below:

$$\begin{aligned}\mathrm{DAGD_t} = {} & \alpha_0 + \sum_{i=1}^{k} b_1 \mathrm{DAGD_{t-i}} + \sum_{i=0}^{k} b_2 \mathrm{DORV_{t-i}} + \sum_{i=0}^{k} b_3 \mathrm{DRER_{t-i}} + \sum_{i=0}^{k} b_4 \mathrm{DM2_{t-i}} \\ & + \sum_{i=0}^{k} b_5 \mathrm{DMGD_{t-i}} + \sum_{i=0}^{k} b_6 \mathrm{DFCG_{t-i}} + \sum_{i=0}^{k} b_7 \mathrm{DCPT_{t-i}} + \delta_1 \mathrm{LAGD_{t-1}} + \delta_2 \mathrm{LORV_{t-1}} \\ & + \delta_3 \mathrm{LRER_{t-1}} + \delta_4 \mathrm{LM2_{t-1}} + \delta_5 \mathrm{LMGD_{t-1}} + \delta_6 \mathrm{LFCG_{t-1}} + \delta_7 \mathrm{LCPT_{t-1}} + u_t\end{aligned}$$

Equation 2: Functional Relationship Model Specification

where k = Lag order (Need to clarify if 1 is good)

ARDL bounds testing procedure permit us to take into consideration I(0) and I(1) variables together. The null hypothesis of the non-existence of a long-run relationship which is denoted by $\mathrm{F_{LAGD}(LAGD|LORV, LRER, LM2, , LMGD, LFCG, LCPT)}$ and the other variables in Eq. (2) are used as dependent variables also denoted with

F_LORV (|LORV|LAGD, LRER, LM2, , LMGD, LFCG, LCPT), F_LRER (|LRER|LAGD, LORV, LM2, , LMGD, LFCG, LC

〖and F〗 _LCPT (|LCPT|LAGD, LORV, LRER, LM2, LMGD, LCPT)

is tested against the alternative hypothesis of the existence of co-integration;

$$\mathrm{H_o} = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$$

against

$$\mathrm{H_1} = \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0$$

The calculated F-statistics derived from Wald test are compared with Pesaran et al. (2001)'s critical values. If calculated F-statistics falls below the (Pesaran, Shin, & Smith, 2001)'s lower bound critical values, we fail to reject the null hypothesis of non-existence of a long-run relationship (i.e. there is no relationship between time series). If calculated F-statistics lies between the lower bound and Upper bound of the (Pesaran et al., 2001)'s critical values, the result is regarded as inconclusive. As such, it is avoided to make certain commitment and referred to other co-integration tests. However, if the calculated F-statistics is upper than the Pesaran et al.(2001)'s Upper bound critical values, we reject the null hypothesis non-existence of a long-run relationship (i.e. there is existence of a long-run relationship between time series).

After estimating the existence of long run relationship between variables the second step is selecting optimal lag length by using of standard criteria such as Swartz Bayesian (SBC) or Akaike Information (AIC). After that long run and short run coefficients could be predicted. ARDL long run form is exhibited in equation below:

$$\mathrm{LAGD_t} = \alpha_0 + \sum_{i=1}^{k} b_1 \mathrm{LAGD_{t-i}} + \sum_{i=0}^{k} b_2 \mathrm{LORV_{t-i}} + \sum_{i=0}^{k} b_3 \mathrm{LRER_{t-i}} + \sum_{i=0}^{k} b_4 \mathrm{LM2_{t-i}} + \sum_{i=0}^{k} b_5 \mathrm{LMGD_{t-i}} + \sum_{i=0}^{k} b_6 \mathrm{LFCG_{t-i}} + \sum_{i=0}^{k} b_7 \mathrm{LCPT_{t-i}} + u_t$$

The Error correction term which was employed in the ARDL Short run model to depict the short run dynamics is shown below

$$\mathrm{DAGD_t} = \alpha_0 + \sum_{i=1}^{k} b_1 \mathrm{DAGD_{t-i}} + \sum_{i=0}^{k} b_2 \mathrm{DORV_{t-i}} + \sum_{i=0}^{k} b_3 \mathrm{DRER_{t-i}} + \sum_{i=0}^{k} b_4 \mathrm{DM2_{t-i}} + \sum_{i=0}^{k} b_5 \mathrm{DMGD_{t-i}} + \sum_{i=0}^{k} b_6 \mathrm{DFCG_{t-i}} + \sum_{i=0}^{k} b_7 \mathrm{DCPT_{t-i}} + b_8 \mathrm{ECT_{t-1}}$$

where ECT = Lagged error correction term.□

We shall be testing the null hypothesis (H_o) of 'non-existence of the long-run relationship' against the alternative of 'the existence of long-run relationship'

$$H_o = b_1 = b_2 = b_3 = b_4 = b_5 = b_6 = b_7 = 0$$

$$H_1 = b_1 \neq b_2 \neq b_3 \neq b_4 \neq b_5 \neq b_6 \neq b_7 \neq 0$$

Logarithm transformation of all variables were taken to achieve stationarity in variance. Thereafter we began be our empirical testing by determining the stationarity of all variables in our consideration. This is necessary in order to proceed with the testing of Co-integration later. Ideally, our variables should be I(1), in that they only become stationary after their 1st difference. The differenced form for each variable used is created by taking the difference of their log forms (e.g. DAGD = LAGD – $\mathrm{LAGD_{t-1}}$).

We then conducted the Augmented Dickey-Fuller, Philip-Perron and KPSS test. (ADF) test on each variable (in both level and differenced form). The results are discussed in the section that follows.

Findings and Interpretations
Unit Root Test

A stationary series has a mean (to which it tends to return), a finite variance, shocks are transitory, autocorrelation coefficients die out as the number of lags grows, whereas a non-stationary series has an infinite variance (it grows over time), shocks are permanent (on the series) and its autocorrelations tend to be unity. If the series is 'stationary', the demand-side short run macroeconomic stabilization policies on exchange rate and Oil prices are likely to be effective and promote economic growth but if the series is 'non stationary', the supply-side policies are more likely to be effective in promoting growth with the increase in money supply and Agricultural output in the long run.

Table 1: Unit root Test

Unit Root Test		ADF TEST			Philips Perron Test			KPSS Test		
Logarithm Transformed Variables	**VARIABLE**	**T-STAT.**	**C.V.**	**RESULT**	**T-STAT.**	**C.V.**	**RESULT**	**T-STAT.**	**C.V.**	**RESULT**
	LORV	-2.161	-3.571	NS	-1.828	-3.534	NS	0.182	0.233	S
	LRER	-1.337	-3.571	NS	-0.266	-3.534	NS	0.155	0.233	S
	LM2	-3.848	-3.571	**S**	-2.135	-3.534	NS	0.135	0.233	S
	LAGD	-1.237	-3.503	NS	-2.518	-3.534	NS	0.145	0.233	S
	LMGD	-0.468	-3.571	NS	-0.236	-3.534	NS	0.160	0.233	S
	LFCG	-1.403	-3.548	NS	-2.466	-3.534	NS	0.149	0.233	S
	LCPT	-2.012	-3.571	NS	-1.509	-3.534	NS	0.132	0.233	S
Differenced Transformed Variables	**VARIABLE**	**T-STAT.**	**C.V.**	**RESULT**	**T-STAT.**	**C.V.**	**RESULT**	**T-STAT.**	**C.V.**	**RESULT**
	DORV	-4.080	-2.988	S	-7.659	-2.961	S	0.293	0.380	S
	DRER	-3.301	-2.988	S	-4.799	-2.961	S	0.356	0.380	S
	DM2	-3.929	-2.889	S	-5.189	-2.961	S	0.159	0.380	S
	DAGD	-5.863	-2.988	S	-6.566	-2.961	S	0.306	0.380	S
	DMGD	-3.128	-2.988	S	-5.490	-2.961	S	0.329	0.380	S
	DFCG	-3.525	-2.949	S	-5.167	-2.961	S	0.381	0.380	**NS**

	DCPT	-3.269	-2.988	S	-2.895	-2.961	**NS**	0.152	0.380	S

NOTE: NS = Non-Stationary and S = Stationary

On the above mentioned results of unit root test we can see that it varies from one test to another test. If we analyze the results of unit root tests of all variables in the level and differenced form, we observe that life expectancy and inflation show different result from ADF and PP tests however, KPSS shows most of the variables are stationary except Gross Fixed Capital in a differenced form. It is more than evident that the results are not consistent across various tests. Therefore, variables we are using for this analysis are I(0) or I(1).

As the results of unit root test are not consistent, as our variables are found to be mixture of I(0) and I(1) and the results shown different in each test. Therefore, we decided to use ARDL technique to test the long run relationship among the variables. Before proceeding with the test of co-integration, we try to determine the order of the vector auto regression (VAR), that is, the number of lags to be used. It is however, not necessary to find the VAR order for the ARDL approach since the process itself find individual lag order to each variable.

Table 2: Var Lag Order Selection

Selection Criteria	Maximum	Optimum
AIC Optimal Var Lag Order	2	0
SBC Optimal Var Lag Order	2	0

Similarly, as we have yearly data and observation is only 32 data points, we assume maximum 2 VAR order, which as shown in the table above, both AIC and SBC recommend no lag order. This can be interpreted as inherent nature of time series data of our study. This is a limitation that can be overcome using ARDL technique, which determines the specific lag order for each variable in our investigations.

Testing for Co-integration

An evidence of co-integration implies that the relationship among the variables is not spurious, i.e. there is a theoretical relationship among the variables and that they are in equilibrium in the long run.

Table 3: Engel – Granger (E-G) Test

Selection Criteria	AIC	SBC	T-Statistics	Critical Value
Order of the ADF test: 1	51.5508	50.1496	-5.8244	1.96
Order of the ADF test: 2	50.5549	48.4531	-3.9188	1.96

As depicted in the above table the critical value is less than the t-statistics. So, we reject the null that the residuals are non stationary. Statistically, the above results indicate that the variables we have chosen, in some combination, result in a stationary error term. The stationarity of error term indicates

that there is Co-integration among variables. These initial results are intuitively appealing, to our mind. On the other hand, that if the variables are not found to be Co-integrated, they may be fractionally Co-integrated. For furtherance to this result, we decided to go for Johansen Co-integration test.

Johansen Co-integration Test

As depicted in the table below, the maximal Eigenvalue and trace of the stochastic matrix shows no Co-integrating vectors, and HQC showed 4, AIC showed 6 and SBC indicate that there are two (2) Co-integrating vectors.

Table 4: Johansen Co-integration test

Criteria	**Number of Cointegerating Vectors**
Maximal Eigenvalue	0
Trace test	0
AIC	5
SBC	7
HQC	3

The implication of the co-integration results above is that each variable contain information for the prediction of other variables i.e. in our research setting, we can predict variable Agriculture by determining the relative price effect and institutional quality variables in the short run as well as long run. However, these results conflict each other, it also conflicts with Engle – Granger. So far, we have seen that these approaches have many limitations that questions the robustness of the techniques. We believe that the limitations can be taken care of using the Standard ARDL Technique. As such we decided to go for ARDL technique with the robust approach for testing co-integration among variables.

Table 5: F-Statistics for testing the Existence of Long-Run Relationship (Variable Addition Test)

Variables	F-Statistics	Critical Value Lower Bound	Critical Value Upper Bound
DAGD	1.4174	2.365	3.553
DRER	1.5943	2.365	3.553
DORV	.76013	2.365	3.553
DCPT	3.0634	2.365	3.553
DMGD	4.9827*	2.365	3.553
DFCG	.59924	2.365	3.553
DM2	6.6226*	2.365	3.553

The critical values are taken from Pesaran et al. (2001), unrestricted intercept and no trend with six regressors. * denote rejecting the null at 5 percent level.

Table above shows the calculated F-statistics for variables DMGD (Manufacturing production %GDP) and DM2 (Money Supply) are 4.983 and 6.623 respectively which are higher than

the upper bound critical value 3.553 at the 5% significance level. This implies that the null hypothesis of no co-integrating long-run relationship can be rejected. These results reveal that a long-run relationship exists variables. This could be considered as a finding in view of the fact that the long run relationship between the variables is demonstrated here avoiding the pre-test biases involved in the unit root tests and co-integration tests required in the standard co-integration procedure. The evidence of long run relationship rules out the possibility of any spurious relationship existing between the variables. In other words, there is a theoretical relationship existing between the variables. However, there is need to confirm the endogeneity and exogeneity of variables.

At this stage we run the ARDL test to confirm the short-term and long-term relationship, study long-run coefficients and error-correction model to identify which variables are endogenous and which are exogenous.

Long Run Coefficient Estimation

Table 6: Estimates of Long-run Coefficients

VARIABLE	F-Statistics	Lower Bound	Upper Bound	C.	Decision Rule
LORV | LRER, LM2, LAGD, LMGD, LFCG, LCPT	0.76013	2.941	4.359	5 %	No Co-integration
LRER | LORV , LM2, LAGD, LMGD, LFCG, LCPT	9.5068	2.941	4.359	5 %	Co-integration
LM2 | LORV, LRER, LAGD, LMGD, LFCG, LCPT	6.6226	2.941	4.359	5 %	Co-integration
LAGD | LORV, LRER, LM2, LMGD, LFCG, LCPT	1.4174	2.941	4.359	5 %	No Co-integration
LMGD|LORV, LRER, LM2, LAGD, LFCG, LCPT	4.9827	2.941	4.359	5 %	Co-integration
LFCG | LORV LRER, LM2, LAGD, LMGD, LCPT	0.59924	2.941	4.359	5 %	No Co-integration
LCPT |LORV, LRER, LM2, LAGD, LMGD, LFCG	3.0634	2.941	4.359	5 %	Inconclusive

The critical values are taken from Pesaran et al. (2001), unrestricted intercept and no trend with six regressors. * denote rejecting the null at 5 percent level.

From the table above, we find that when Agricultural output is the dependent variable, the calculated F-statistic F_{LAGD} (LAGD | LORV, LRER, LM2, LMGD, LFCG, LCPT) =1.4174 is less than the upper bound of the critical value obtained from Pesaran et al. (2001), indicating there is no significant evidence for co-integration between Agricultural output and its determinant in Nigeria for the study period. However, the evidence of long run relationship rules out the possibility of any spurious relationship existing between the variables. In other words, there is a theoretical relationship existing between the variables. The process has been repeated for the other variables and result shows that, Real exchange rate, Money Supply (M2) and Manufacturing output(MGD) indicate compelling evidence of long run relationship with the determinants.

Now, we can argue that Real exchange rate is Co-integrated with Agriculture, Oil Revenue and our institutional quality variable. Oil revenue and Agriculture doesn't seem to be co- integrated with their determinants while the result of institutional quality remained inconclusive.

Table 7:Estimated Long Run Coefficients using the ARDL Approach

Dependent Variable: AGD (Doesn't Make any Sense)		
Regressors	Coefficient	T-Ratio[Prob]
LORV	-0.145 (0.068)	-2.135[.044]
LRER	0.076 (0.099)*	.7646[.453]
LM2	0.362 (0.191)*	1.893[.072]
LMGD	-0.007 (0.151)*	-.0456[.964]
LFCG	-0.385 (0.219)*	-1.761[.092]
LCPT	-0.246 (0.175)*	-1.404[.174]
INPT	2.592 (0.4)	6.488[.000]

Note: * denotes significant at 5 percent level, figure in the first bracket ( ) denotes standard error, and figure in the third bracket [ ] denotes p values.

Error Correction Model of ARDL

In the following table, the ECM's representation for the ARDL model is selected with AIC Criterion.

Table 8: Error Correction Model of ARDL

Error Correction Representation for the Selected ARDL Model ARDL selected based on Akaike Information Criterion (AIC)					
ecm1(-1)	**Coefficient**	**Standard Error**	**T-Ratio [Prob.]**	**C.V.**	**Result**
dLORV	-0.36413	0.086696	-4.2000[.000]	5%	**Endogenous**
dLRER	-0.2281	0.15038	-1.5168[.142]	5%	**Exogenous**
dLM2	-0.39036	0.12517	-3.1187[.005	5%	**Endogenous**
dLAGD	-0.59911	0.14983	-3.9986[.001]	5%	**Endogenous**
dLMGD	-0.50059	0.15725	-3.1833[.004]	5%	**Endogenous**
dLFCG	-0.65298	0.17722	-3.6846[.001]	5%	**Endogenous**
dLCPT	-0.14123	0.093231	-1.5149[.143]	5%	**Exogenous**

Notes: * denotes significance at 5 percent level

As discussed earlier, Co-integration tells us that there is a long run relationship between the variables. However, there could be a short-run deviation from the long-run equilibrium. Co-integration does not unfold the process of short-run adjustment to bring about the long-run equilibrium. For understanding that adjustment process we adopt the error-correction model. The T-ratio or the p- value of the error-correction coefficient indicates whether the deviation from equilibrium (represented by the error-correction term, 'ecm') has a significant feedback effect or not on the dependent variable (e.g. Agriculture value added to GDP). In other word, whether the variable is endogenous or exogenous.

The error-correction coefficient being significant confirms our earlier findings of a significant long-run Co-integrating relationship between the variables. Also, the coefficient of the error-correction term indicates the speed of short run adjustment of the dependent variable to bring about the long run equilibrium. The size of the coefficient of the error-correction term is also indicative of the intensity of the arbitrage activity to bring about the long-run equilibrium. The error correction coefficient estimated for Agriculture (LAGD) and Oil Revenue is -0.599 (0.15) and -0.364(0.087) respectively, which is insignificant, has a negative sign and implies a slow speed of adjustment to equilibrium after a shock. The error correction coefficient estimated for Real Exchange Rate (LRER) and Corruption Index (LCPT) at -0.228(0.15) and -0.141(0.093) are highly significant, has the correct sign and implies exist a medium to long term adjustment to equilibrium after a shock. Finally, the "t" or "p" value of the coefficients of the Δ (i.e. ,differenced) variables indicate whether the effects of these variables on the dependent variables are significant or not in the short run.

Furtherance to this, we can argue that VECM has given a clear picture of short and long run relationship among variables, regarding our research objective, VECM shows that two of our focus variables are endogenous and the other two are exogenous, that is half of these variables are dependent on other variables while the other half are independent of other variables. This helps us to argue that there is a dynamic relationship among the Dutch disease relative price effect variables and Institutional quality. Our result shows that Oil revenue is endogenous, which we find to be counter intuitive, as theory and empirical evidence suggest that oil revenue affect growth in the long run, especially for countries which are heavily dependent on oil rents. More so, Nigeria's has been highly dependent on crude oil revenue with oil rents contributing substantially to the country's GDP.

Although the error correction model tends to indicate the endogeneity/exogeneity of a variable, but it does not indicate the relative degree of endogeneity or exogeneity. As such, we had to apply the variance decomposition technique (VDC) to discern the relative degree of endogeneity or exogeneity of the variables.

Variance Decompositions (VDC)

The relative exogeneity or endogeneity of a variable is determined by the proportion of the variance explained by its own past (Domingos, 2000).

The analysis aims at calculating the contribution of innovations to the forecast-error variance. To that effect, we express the individual forecast-error variance to a given horizon in function of the error variance assigned to each variable in the system in order to obtain the relative importance in percentage. Over a 20-year horizon the results presented in Table 8. It indicates the extent to which the individual forecast-error variance of any variable is explained largely by its own variations. It is worth stressing that the contributions are higher for the variables at the earlier periods than the later over the 20-year horizon. Another feature of substantial importance is that all the variables almost contribute to the forecast- error variance of any variable, which implies that there are cross effects between the variables.

The variable that is explained mostly by its own shocks (and not by others) is deemed to be the most exogenous of all. We started out applying generalized VDCs and obtained the following results.

Table 8: Generalized Variance Decomposition

GENERALIZED APPROACH								
	VARIABLE	**LAGD**	**LCPT**	**LFCG**	**LM2**	**LMGD**	**LORV**	**LRER**
5 Years Horizon	LAGD	**33.86%**	9.76%	14.60%	9.06%	8.05%	22.89%	1.78%
	LCPT	4.45%	**57.62%**	2.40%	4.30%	14.18%	12.55%	4.50%
	LFCG	22.09%	7.48%	**31.31%**	1.69%	2.85%	30.64%	3.95%
	LM2	17.76%	5.09%	9.03%	**34.40%**	11.64%	15.03%	7.05%
	LMGD	24.98%	3.79%	18.00%	3.83%	**27.24%**	21.39%	0.77%
	LORV	16.01%	8.86%	19.74%	2.02%	9.39%	**32.43%**	11.56%
	LRER	2.60%	24.05%	7.57%	6.32%	10.52%	6.31%	**42.64%**
	Exogeniety	33.86%	57.62%	31.31%	34.40%	27.24%	32.43%	42.64%
	Ranking	4	1	6	3	7	5	2

	VARIABLE	**LAGD**	**LCPT**	**LFCG**	**LM2**	**LMGD**	**LORV**	**LRER**
10 Years Horizon	LAGD	**31.34%**	9.76%	15.84%	8.26%	7.44%	25.08%	2.29%
	LCPT	5.99%	**46.87%**	4.14%	4.08%	22.45%	12.58%	3.90%
	LFCG	20.51%	10.56%	**28.44%**	2.54%	4.93%	28.50%	4.52%
	LM2	17.21%	12.16%	9.03%	**28.99%**	10.27%	15.36%	6.99%
	LMGD	24.55%	9.76%	15.25%	3.27%	**19.77%**	26.10%	1.31%
	LORV	12.09%	16.02%	16.03%	1.54%	20.25%	**24.27%**	9.81%
	LRER	2.91%	21.50%	7.36%	5.08%	19.66%	6.18%	**37.31%**
	Exogeniety	31.34%	46.87%	28.44%	28.99%	19.77%	24.27%	37.31%
	Ranking	3	1	5	4	7	6	2

	VARIABLE	**LAGD**	**LCPT**	**LFCG**	**LM2**	**LMGD**	**LORV**	**LRER**
15 Years Horizon	LAGD	**30.46%**	11.79%	15.46%	8.03%	7.36%	24.62%	2.29%
	LCPT	9.61%	**41.85%**	5.60%	3.69%	19.10%	16.93%	3.23%
	LFCG	20.08%	12.91%	**26.73%**	2.36%	4.91%	28.62%	4.40%
	LM2	16.96%	11.76%	9.46%	**27.46%**	10.59%	16.84%	6.93%
	LMGD	23.91%	11.05%	14.77%	3.22%	**19.65%**	25.85%	1.56%
	LORV	11.25%	15.31%	14.81%	1.50%	27.89%	**20.75%**	8.50%
	LRER	5.03%	18.88%	8.12%	4.74%	21.61%	8.69%	**32.93%**
	Exogeniety	30.46%	41.85%	26.73%	27.46%	19.65%	20.75%	32.93%
	Ranking	3	1	5	4	7	6	2

	VARIABLE	**LAGD**	**LCPT**	**LFCG**	**LM2**	**LMGD**	**LORV**	**LRER**
20 Years Horizon	LAGD	**29.32%**	13.02%	14.85%	7.69%	8.67%	24.22%	2.22%
	LCPT	9.92%	**40.78%**	5.84%	3.58%	18.73%	18.03%	3.12%
	LFCG	19.59%	13.45%	**25.85%**	2.33%	6.31%	28.20%	4.27%
	LM2	17.00%	12.66%	9.37%	**26.76%**	10.46%	16.96%	6.79%
	LMGD	22.84%	13.92%	13.79%	2.98%	**19.31%**	25.71%	1.45%
	LORV	12.28%	13.32%	15.14%	1.41%	28.83%	**21.28%**	7.75%
	LRER	6.14%	17.67%	8.91%	4.43%	21.06%	10.83%	**30.96%**
	Exogeniety	29.32%	40.78%	25.85%	26.76%	19.31%	21.28%	30.96%

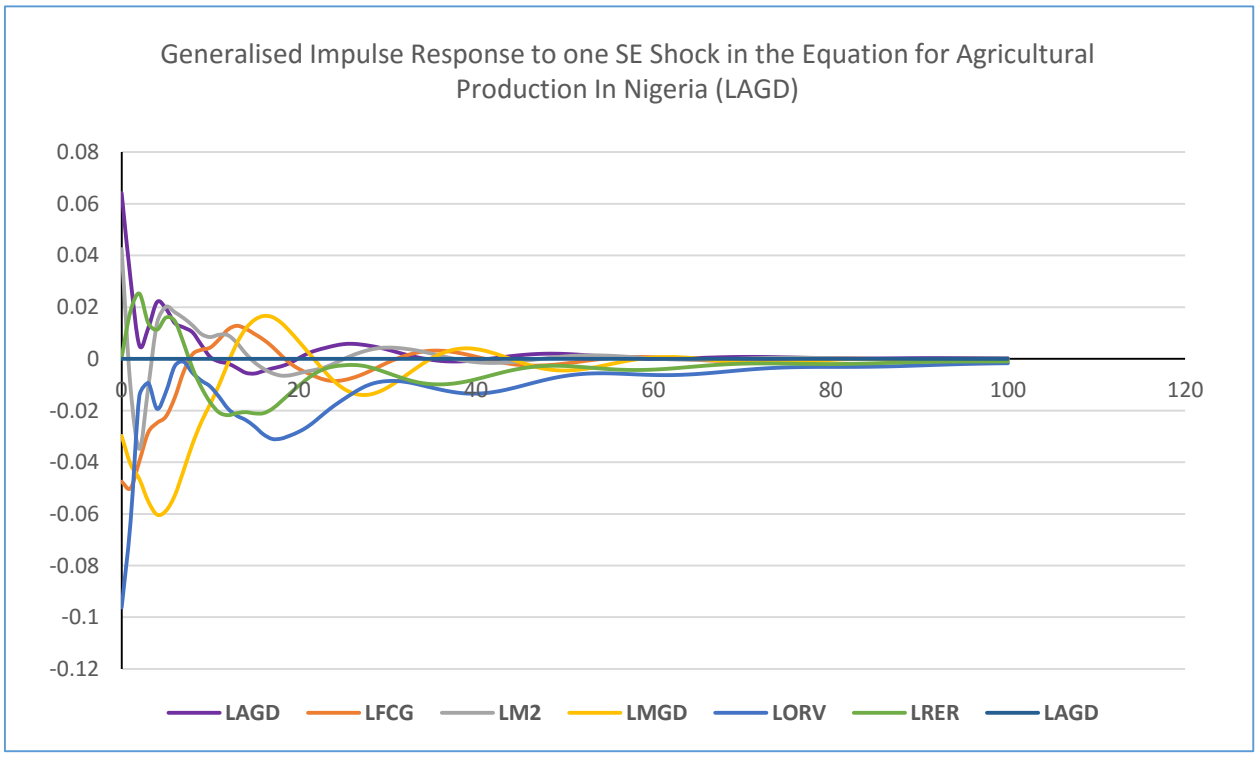
Ranking	3	1	5	4	7	6	2

From the table above, it can be seen that in the 5-year horizon, Corruption Index is the most exogenous while Manufacturing Production is the most endogenous followed by Oil rent. In the 10-year horizon, Manufacturing production still remained the most endogenous and interestingly Agricultural production became more exogenous and Oil rent became more endogenous. In the medium term, Manufacturing Production, oil rent and Gross fixed capital remained the most endogenous and remained so in the long run. In the short, medium term and long term, Corruption and exchange rate remained the most and second most exogenous variable respectively. In other words, they remained leader over the 20 years' period.

This shows that Oil boom impact on the Nigerian manufacturing sector is less and minimal compared to corruption which is acclaimed to have eaten into the fabric of the nation. Similarly, Agricultural production has impact on the Oil boom rather than Oil rent having impact on Agricultural production. While corruption still has impact on agriculture, its impact is seen to decline in 10-year horizon.

Impulse Response

Figure 3:Shock of Agricultural Production to other variables



GENERALIZED IMPULSE RESPONSE TO ONE SE SHOCK IN THE EQUATION FOR CPT, RER, ROV ON AGRICULTURAL PRODUCTION IN NIGERIA

Figure 4: Shock of Corruption to Agriculture

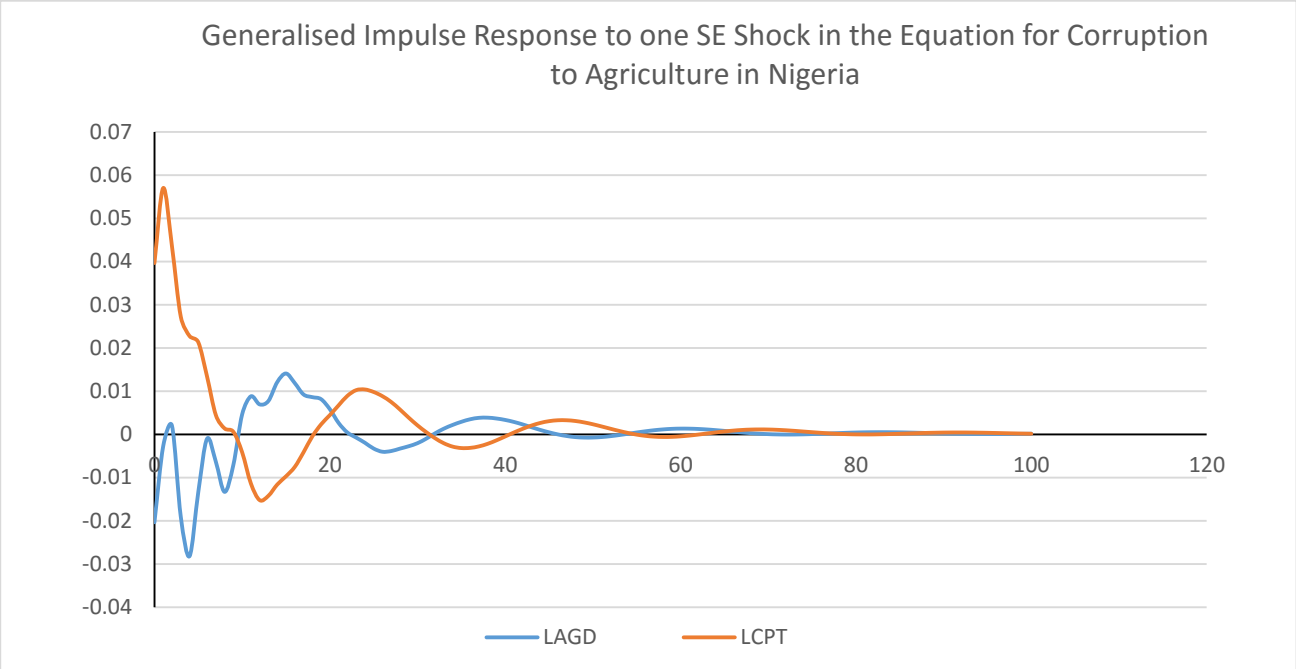


Figure 5: Shock of Real Effective Exchange rate to Agriculture

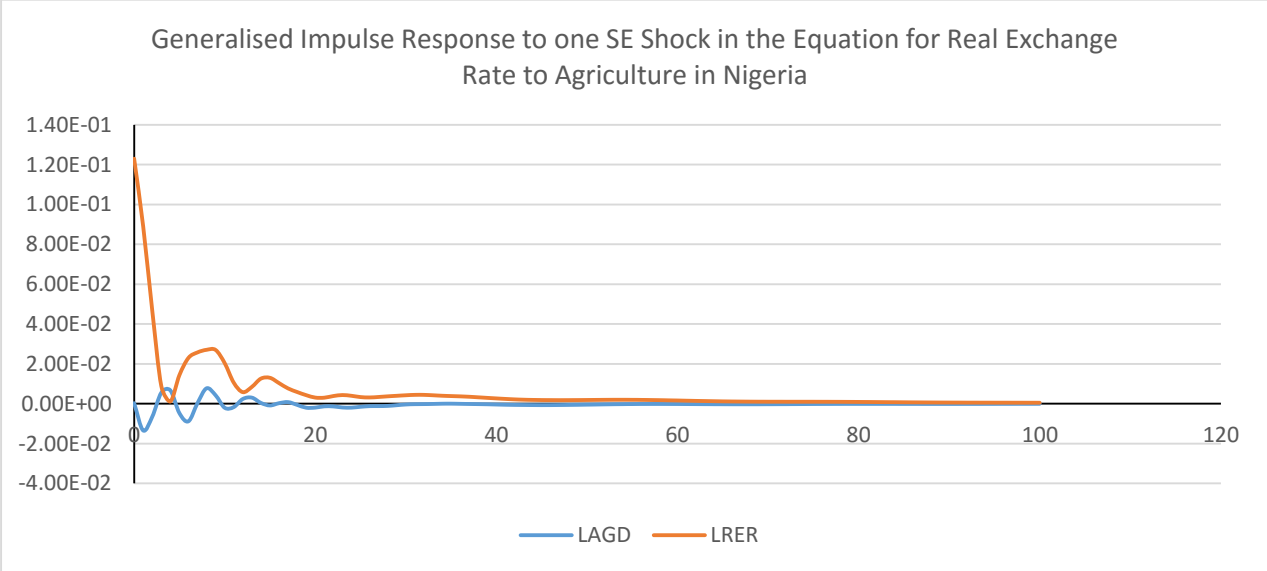
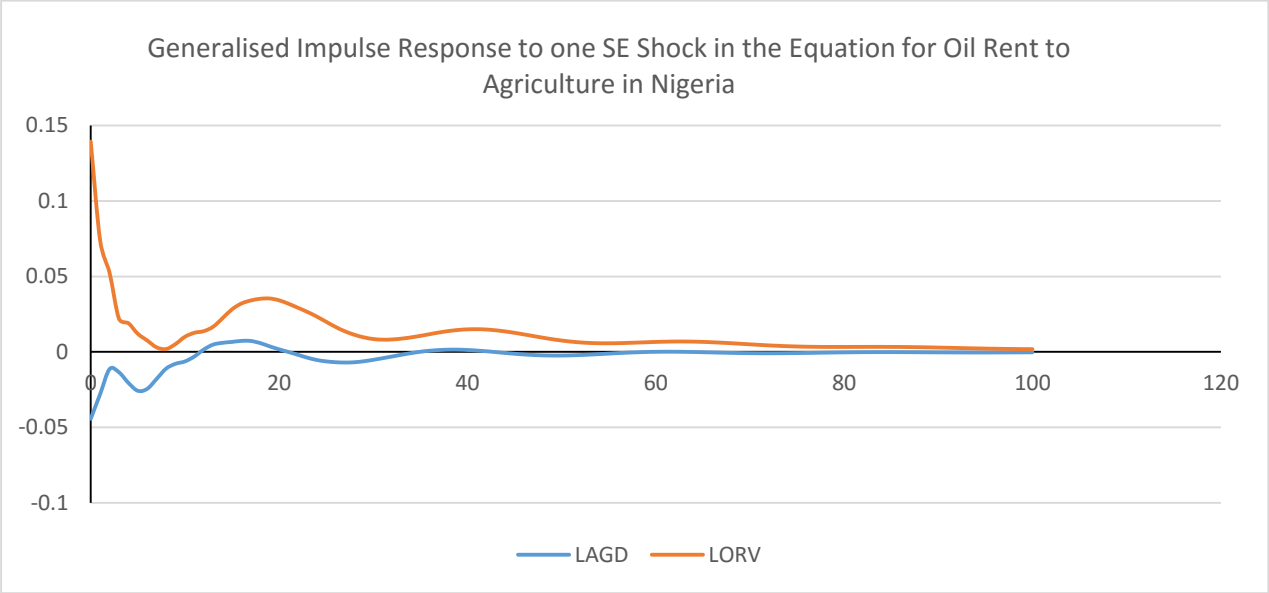


Figure 6: Shock of Real Effective Exchange rate to Agriculture



VDC and Impulse Response Analysis and Findings

From the table, it appears that both Corruption and the real exchange rate dominate the system to some extent as their forecast errors are largely attributable to their own innovations: about 58% and 43% respectively of the forecast error variance are explained by their own innovations at the first 5-year period and about 41% and 31% respectively considered in the variance decomposition.

From the analysis of VDC and impulse response (IR), which necessarily shows the same result in different form, by shocking our target variables, mostly Corruption has identified its affect on Agricultural Production indicating an inverse relation. We can argue that the result in IR seems to support the findings from VDC, however, this is supported by theory or counter intuitive.

We can argue that shock in Real exchange rate has a slight significant effect on Agriculture this is in support of the findings in Warr (1985), this result is consistent in both IR and VDC, which is however is against our theory of Dutch disease. Findings show that Agriculture is exogenous, which seem to be counter **intuitive for the case of Nigeria,** one the one hand, we can argue that Agriculture should be endogenous, which was found to be endogenous in ARDL variable addition test as in the long run Agriculture value added to GDP would depend on the

More so, Oil Revenue also seem to have a slight significant impact on agriculture across the horizon in both VDC and IRF. This result is in resonance with the idea is that "easy" revenues corrupt and bring about conflicts (Ross 1986), and encourage economically inefficient, but politically important projects. To mitigate such problem in the case of Nigeria, (Sala-i-Martin & Subramanian, 2013) suggest decentralizing revenues in Nigeria, by distributing them directly to the people, so the government is forced to finance public services by taxes.

The major finding here is that variations in agricultural output are predominantly by Real Exchange rate followed by Oil revenue and Money supply variables respectively in the short run. While the Corruption variable followed by real exchange rate explained more than its own shock in the long run. Thus, in the long run, Corruption is the most important variable that explains variations in agricultural output as share of GDP if own innovation is assumed away. These confirm that institutional quality, real exchange rate and the oil revenue are important source of variation in

agricultural production in Nigeria. Likewise, over the medium to longer term (15–20 years), changes in the Corruption index real (aside from the effects of its own shock) are only explained by shocks to the real exchange rate and Oil revenue. These are akin to the response found in the impulse response functions (IRFs).

Conclusion

The results above shows that Agriculture value added to GDP responds to movements in Institutional quality (Corruption) and offer support for the hypothesis that agriculture as a share of GDP responds to movements in real exchange rates and oil revenue and shows that most of the dynamic interaction takes place in the long run. These results are consistent with Olusi and Olagunju's (2005) as well as Bature (2013) model of speculation and theoretical groundwork of Dutch disease. Rising oil prices can breed appreciation of real exchange rate which will lead to contraction of the traditional tradable sector (agriculture).

However, is showed that Nigeria is suffering more from corruption and poor institutional quality than the Dutch disease. This is somewhat paradoxical to earlier deviant findings that Nigeria is not suffering from the Dutch disease (find him, 2013) and that Nigeria is only suffering from dutch disease (Bature, 2013). Although Dutch disease is present in the long run. A possible explanation for earlier findings could be because the authors assumed that corruption would not impact on Agricultural output. Perhaps that oil would impact manufacturing rather than agriculture, which is rather know to have been Nigeria's traditional leading foreign exchange earner and the traditional tradable sector of most less developed economies. Likewise, it is also a known fact that manufacturing sectors in the less developed economies are still not developed to the stage where their products will enjoy large foreign patronage and become tradables as in the case of highly industrialized and developed economies.

The contraction of the agricultural sector in resource boom countries, especially Nigeria, was triggered by the sudden windfall from oil but suffers more due to poor institutional quality and increasing levels of corruption. It is therefore recommended that government should focus more on the traditional tradable sector and strive efficient institutional quality which will ensure that resources are prudently utilized, which is necessary for the development of the agricultural sector with long-term potential for sufficiency in food and economic development. It is clear that things changed domestically in this regard in recent years in Nigeria as evidenced in our quantitative analysis although at an insignificant rate. The recent rise in the local contribution of non-oil to GDP (as seen in the third phase of the economy) is an indication of potential prosperity in diversification, which is a welcome development for the agricultural sector as well as other non-oil sectors in the Nigerian economy.

The results in this study have a number of policy implications. As expected, real exchange rates respond to the price of oil and the quantity of oil produced in Nigeria. Also, the agriculture share of GDP responds to both the exchange rate and the price and quantity of oil produced in Nigeria to confirm that Dutch disease is real although not as significant as corruption in the economy. Thus, increased oil revenues could hurt the whole economy if there is no prudent management, which ca only be guaranteed through qualitative institutional policies that rid corruption, wastage and unproductive use of resources.

The negative effects of oil revenues being spent on unproductive activities are visible in Nigeria. We find that appreciation in the country's Corruption index and the real exchange rate led to a significant contraction of the agricultural sectorial productivity. Such a scenario could be reversed if the revenues of oil were used on productive activities.

Provision of extension services and new technology by the government to the agricultural sector could enhance increase productivity in the sector. In addition, spending a significant proportion of the oil revenues on infrastructural facilities would greatly enhance workers' productivity which would result in both short- and long-term growth. It is important that the government of Nigeria prioritize agricultural sector again with more sense of responsibility and strong effort in reducing the impact of corruption on the implementation of policies.

References

Arreaza, a., Castilla, L. M., & Fernandez, C. (1984). Booming Sector and Dutch Disease Economics : Survey and Consolidation. Oxford Economic Papers , New Series , Vol. 36 , No . 3, 359-380.

Bature, B. N. (2013). The Dutch Disease and the Diversification of an Economy: Some Case Studies., 15(5), 6–14.

Benkhodja, M. T. (2014). Monetary policy and the Dutch disease effect in an oil exporting economy. International Economics, 138, 78–102.

Corden, W. M., & Neary, J. P. (1982). Booming Sector and Deindustrialization in a Small Open Economy. The Economic Journal, 92, 825–848.

Domingos, P. (2000). A Unified Bias-Variance Decomposition for Zero-One and Squared Loss.pdf. Seventeenth National Conference on Artificial Intelligence, (1999), 564–569.

Mehlum, H., Moene, K., & Torvik, R. (2006). Institutions and the resource curse. Economic Journal, 116(508), 1–20.

Nigeria, A. (2015). Corruption and Poverty In Nigeria (Vol. 234).

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level

relationships. Journal of Applied Econometrics, 16(3), 289–326.

Rodríguez, F., & Sachs, J. D. (1999). Why Do Resource-Abundant Economies Grow More Slowly? Journal of Economic Growth, 4(3), 277–303.

Ross, M. L. (1999). The Political Economy of the Resource Curse. World Politics.

Rosser, A. (2006). Escaping the Resource Curse. New Political Economy, 11(4), 557–570.

Sachs, J. D., & Warner, a M. (2001). Natural resources and economic development: the curse of natural resources. European Economic Review, 45, 827–838.

Sachs, J. D., & Warner, A. M. (1997). Natural Resource Abundance and Natural Growth. National Bureau of Economic Research (Havard University), 1–50.

Sala-i-martin, X., & Subramanian, A. (2003). ADDRESSING THE NATURAL RESOURCE CURSE. NBER WORKING PAPER SERIES, No. 9804(June), 46.

Sala-i-Martin, X., & Subramanian, A. (2013). Addressing the natural resource curse: An illustration from Nigeria. Journal of African Economies, 22, 570–615.

Van Wijnbergen, S. (1986). Exchange rate management and stabilization policies in developing countries. Journal of Development Economics, 23(2), 227–247.

Vanwijnbergen, S. (1984). the Dutch Disease - a Disease After All. Economic Journal, 94(373), 41–55.

Figure: Shock of Agricultural Production to other variables

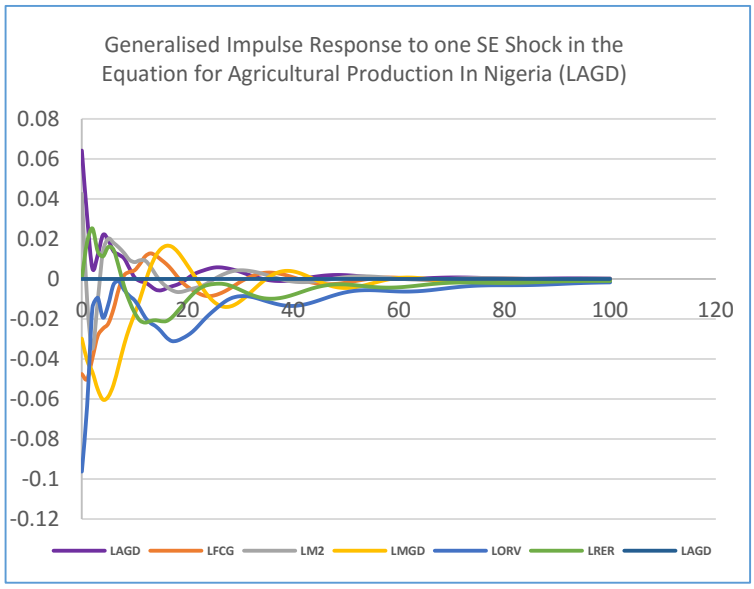


Figure: Shock of Corruption Index to other variables

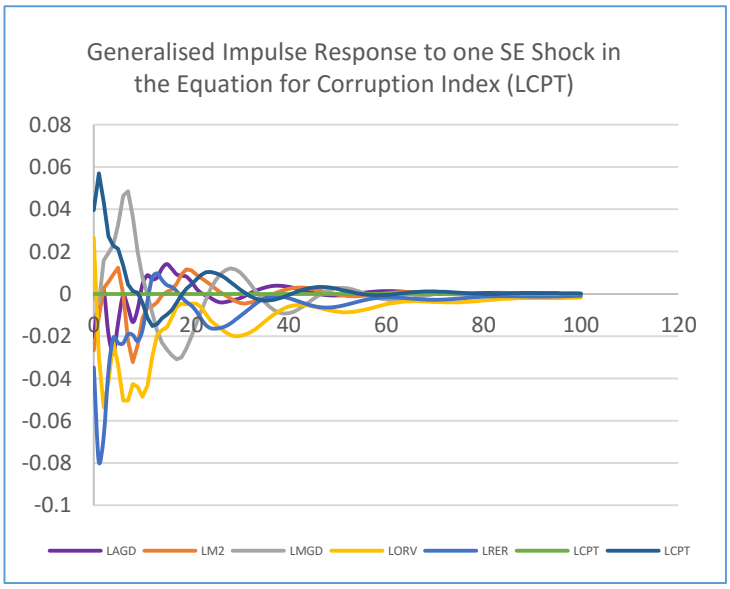


Figure: Shock of Gross Fixed Capital to other variables

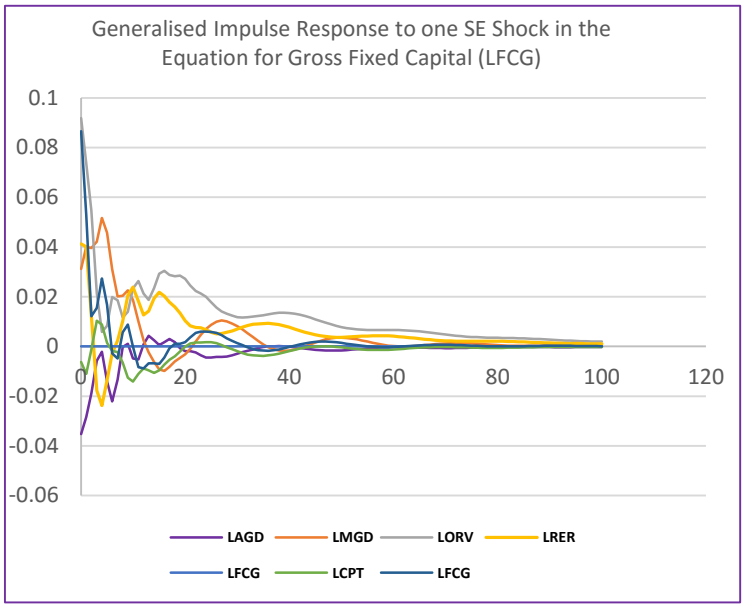
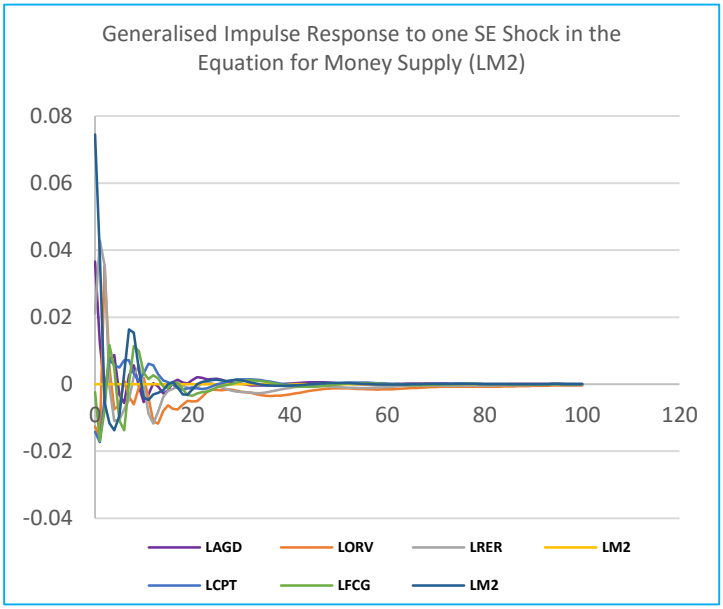
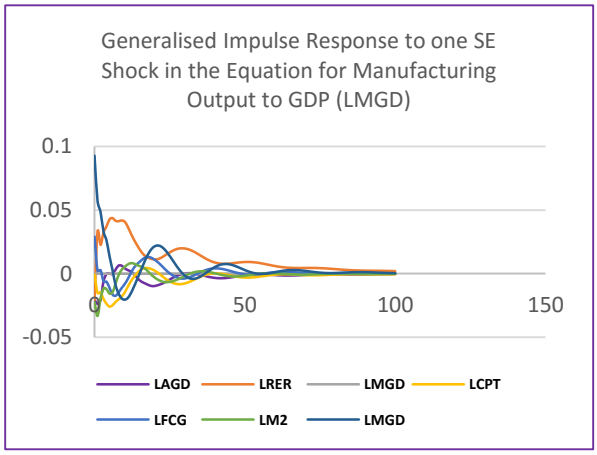


Figure: Shock of Money Supply



to other variables

Figure: Shock of Manufacturing Output to other variables



to other variables

Figure: Shock of Foreign Exchange Rate to other variables

Figure: Shock of Oil Rent