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Comparative analysis of two resources-based economies: A study of policy recommendation toward sustainable development

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ABSTRACT

This is a comparative study between two resource endowed economies, Norway and Nigeria towards ascertaining the impact of the resources in the sustainable development (SD) of the countries. The findings are expected to be a highlight for the poor performing economy (Nigeria) and to replicate the tested and workable policies of Norway to Nigeria economic performance. Separate empirical estimates and analyses with quarterly data of (1992QI-2018QIV and 1992QI-2019QIV) for both countries (Nigeria and Norway) respectively are done for each in a time series manner. The results from the both autoregressive distributed lag (ARDL) and granger causality for both countries are as follows: Dutch disease is found via government spending effects and crude oil price on agriculture. Foreign direct investment (FDI), real gross domestic product (GDP) and real exchange rate are found positively impacting Nigerian agricultural sectors. The findings for the Norway's case are as follows: Dutch disease symptom is found via government spending effects, real exchange rate and crude oil price on manufacturing sector. From granger causality findings, there is a clear exposition of nexus among the government spending, oil price, FDI and real exchange rate which shows implication of government spending and oil price in both studies. This is a pointer towards existence of Dutch disease in both countries. This, notwithstanding, Norway as a country is among the best performing economies of the world due to efficient and effective policies. Nigeria having performed so poor is expected to consider Norway as a model in mitigating her Dutch diseases.

1. Introduction

Natural resources such as crude oil is considered among the determinants of economic and environmental performance. Though, the economic impact is mostly believed to be positive, a handful of studies have exposed the negative impact of abundant natural resources on the located economies (Haseeb et al., 2020; Zallé, 2019.; Balsalobre-Lorente et al., 2018; Erum and Hussain, 2019; Corden and Neary, 1982; Wijnbergen, 1985; Gelb, 1988; Sachs and Warner, 2001). Many economies especially the developing countries have experienced negative impact of the abundant resources deposit instead of the presumed positive impact. The increase in the revenue generated from the resources sometimes exposes the economy to some macroeconomic problems such as inflation caused by temporal and fluctuating exchange rate, sectoral (frictional) unemployment caused by a neglect of the basic sectors before the boom of the natural resources (Ezeala - Harrison, 1993). Contraction of the traditional/non-oil sector is part of the negative impact of oil boom in some of the oil rich countries. The active players in the non-resource tradable sector face high cost of production because of the increase in general domestic price level caused by the resource boom. This is expected to affect both the cost of production and the quantity of output which will lead to the contraction of the non-resource (tradable sector - manufacturing or agricultural sector). Also, a neglect of the traditional sectors contributes to the contraction and extinct of affected sectors. The vulnerability of the economy is seen when the proceeds from the resources determine a greater part of the country's income (GDP growth) which often time causes a neglect to other non-resource sectors (manufacturing and agricultural sectors) in both developed and developing countries.

From the global oil resource allocation, it is observed that oil resource spreads across the two economic blocks (developed and developing) of the world in uneven measures. Among the highly endowed oil resource countries from the both blocks are Norway and Nigeria. The countries (Norway and Nigeria) are among the economies

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whose sovereign wealth are partly anchored on sovereign oil funds but differ in economic operations and development. The bedrock of the two economies (Norway and Nigeria) before the discovery and boom of oil resources are manufacturing and agriculture for Norway and Nigeria respectively. Discovery of oil resources and exploration started almost the same periods in both countries, with Nigeria (1956) and Norway (1960s) and with same threshold of GDP per capita as at the time of oil discovery. However, the two economies did not follow the same path of handling the oil generated revenues. The discovery and exploration of Norway's oil resource came with adoption of some oil policies known as ten (10) commandments by the parliament to ensure the country's control on its continental shelf (Bjerkholt et al., 1990; Mehlum, 2008; Philips, 2008). Following the adaptation of the Ten Commandments is the creation of the Government Pension Fund (GPF) by the authorities to ensure reinvestment of oil generated revenue over a long-term period, with the consideration and support of present and future generations. On the opposite, Nigeria as a country with almost 90 percent of its export revenue from oil has not been found threading this part of sustaining the economy like Norway for the betterment of the present generation talk more of future generation. The revenue generated from oil resource is used to run and maintain the government handled by few, and servicing of the external debt. Consequently, this has not strengthened the economy and development sufficiently. This has put Nigeria in a sorry state where the country is characterized with increased political and economic instability, poverty ridden society with high insecurity of lives and properties. Due to corruption and lack of transparency in the country (Nigeria), no verified accounting of the expenditure of the oil generated revenue for years has been given, instead, the successive governments will always toe the ways of accusing the past government of mismanaging the nation's wealth without making any meaningful progress. Norway, specifically is among the wealthiest countries in the world with values of real GDP per capita (USD 81,697.25) and Gross Domestic Products (434.2 billion USD) respectively, while Nigeria is in the threshold of the less developed and hunger thriving economy with real per capita GDP (USD 2028.18) and Gross Domestic Product (397.3 billion USD). Norway as a country has threaded the path of development to become a developed economy which can be attributed to the calculated and transparent way of distributing its oil-resourced revenues by its authorities. On the contrary, Nigeria as a country endowed with vast oil resource has not experienced the same level of growth and smooth economic performance like its counter path Norway. The current events that surround the poor economic performance in the country depicts Nigeria as a country lagging behind due to mismanagement of its resource. This has triggered anger and frustration from its citizens against the managers of the government and its functions. Oil resource has many implications to the economies of the countries with high deposit of it and high dependency on its revenue such as the volatility associated with the price and supply of the resource, cost of extracting and production of the resources, and non-renewable nature of the resources. Amidst the highlighted challenges surrounding the resource, Norway is among the few countries with success story of securing a positive effect of the resource on their economic operations countering the symptoms of Dutch disease in its economy, while Nigeria is beclouded with the intricacies involved in abundance of the resources.

Considering the heterogeneous nature of the impact of the oil resource in both countries (Norway and Nigeria), the current study is structured in a way to comparatively discuss the disparity between the two economies in terms of handling the resource and the revenue generated from their sovereign wealth and possibly suggest the best way Nigeria can bounce back to economic performance taking from the path of Norway. Also, in line with the UN-SDGs, this study has adopted the sustainable development analyses through scientific estimations for a valid and factual expose on both countries' economic performances. This, we planned doing by running a separate econometric estimate with different models as relates to the economic performance of each country. The intuition behind adopting multiple models is that the concepts of this study is subject to multiple dimensions of possible analysis. This will give a detail and more expository situation of both countries with in-depth findings of two countries anchored on accuracy and validity the approaches applied. The insight will be based on empirical analysis and findings anchored on econometric modelling of sustainable development with specific on economic performance. Part of the motivation of this study is to gain insightful knowledge of the two economies and analyze the different paths and initiatives adopted by the two economies with regards to management of their revenue generated via oil resource, and more specifically the effect of the richly endowed resources towards their sustainable development. Indeed, this is not the first research on any of the selected countries, Norway and Nigeria, with regards to the implication of endowed resources (oil resource) to their economic performance, but none has tried to do a comparative analysis of the two economies based on a country specific analysis. Also, most of the studies (Herendeen and Tanaka, 1976; Ahmad and Wyckoff, 2003; Munksgaard et al., 2005; Lenzen, 1998) are centered either on economic performance or energy implication of the rich resources in the two mentioned countries which might not give clear insight into the sustainability of the economies. This study is structured to compare the two economies (Norway and Nigeria) based on a country-specific (time series) analysis with separate modelling and estimates of the economic performance. This makes the present study unique and distinct from other works. Many analyses have been made on the Norway's positive handling of the sovereign wealth of the economy which proved the successful trend of its oil funded economy (Mehlum, 2008; Philips, 2008 etc), but Nigeria is on the contrary owing to her non-transparent nature of the handling the oil revenue of the country by its authorities. This is part of the reasons for this comparative study, and inquiry into understanding the modalities behind a well -functioning oil backed economy such as Norway.

Upon carefully estimations and analyses leading to the completion of this comparative study, reasons and implications will be explored and described in order to gain better understanding of the workings of the sustainable development of both countries, and policy recommendation will be suggested to any of the countries lagging behind from the operation in the counterpart country.

The rest of the study will be based on section 2. Theoretical background, section 3. Data and methodology, section 4. Empirical results and discussions, section 5. Summary and policy suggestions.

2. Theoretical background

Theoretical background of this study is based on the Corden and Neary (1982) and Neary and Van Wijnbergen, (1986) views on Dutch disease theory. Dutch disease theory is a negative effect of the abundant natural resources on any country's economy through a spike in the value of the country's currency which encourages excessive import against export. Dutch disease concept was first noticed and acknowledged in the case of Netherland where a vast natural gas deposits were found in the North Sea in 1959. The massive exploitation of this resources through export resulted in the appreciation of the Dutch. This exposes the producers and exporters of the non-resource products to a stiff competitive environment and make them less competitive in the world market because of the sharp appreciation of the Dutch. Consequently, profits accrual to exporters start to decline, and this causes shrinking of production, income and employment (Ezeala - Harrison, 1993).

The Corden and Neary (1982) and Neary and Van Wijnbergen, (1986) views on Dutch disease theory are presented under two hypotheses, spending effect and resource movement effect. This is hypothesized as;

a. A decline or contraction of the (non-resources)tradable sector (agriculture or manufacturing sectors for the cases of Nigeria and Norway) is a function of spending effect

b. A decline or contraction of the tradable sector (agriculture or manufacturing sectors for the cases of Nigeria and Norway) is a function of resource-movement effect

The spending effect is assumed initiated by government since the revenue generated through the resource is accrual to the government of the country. The spending effect affects the economic performance of any country through the forces of demand and supply displayed on traded and non-traded goods. The windfall revenue from the natural resource will increase the domestic income through increased spending by government, and this will increase the purchasing power of people who will like to spend more money on both traded and non-traded goods. The prices of these two categories of goods (traded and non-traded) are determined endogenously and exogenously, that is, in the domestic market and in the international markets. The higher domestic income will result to excess demand of the non-traded goods (service sector) which will push the prices up and this will make it profitable to produce these goods. However, the producers of the tradable goods (manufacturing and agricultural products) whose prices are determined in international markets will record no increase profitability because of currency appreciation and increase in the price of the traded goods. Following the less profitable of the traded goods, the sector that is saddled with the traded goods, agriculture in case of Nigeria and manufacturing in the case of Norway, will start contracting. At this juncture, the demand curve for the non-traded goods will shift outward to the right depicting profitability of the non-traded goods due to the increase of the relative prices of non-traded goods (Van Wijnbergen and Neary, 1986). Following the theoretical background of this studies as it concerns the negative impact of the endowed resource (oil) on the manufacturing and agricultural sectors, the statistics showing the trend of the value added by the manufacturing and agricultural sectors as percentage of GDP of Norway and Nigeria is displayed in Figs. 1 and 2 with manufacturing sector of Norway depicting declining and agriculture increasing (see Fig. 3).

Also, resource movement effect is part of the hypotheses in the Dutch disease theory. This is part of the cause of contraction of the traditional traded sectors in the economy. It is evident when the booming sector (i.e., the oil resources sector) shares domestic factors of production with other sectors of the economy. The juicy nature of the oil sector because of the windfall in revenue generation will cause the booming sector to bid up the prices of the factors of production thereby enhancing the productivity of the factors in the oil sector. Consequently, the productive power of the producers and exporters of the traded goods will be affected following the disincentive through the appreciation of the

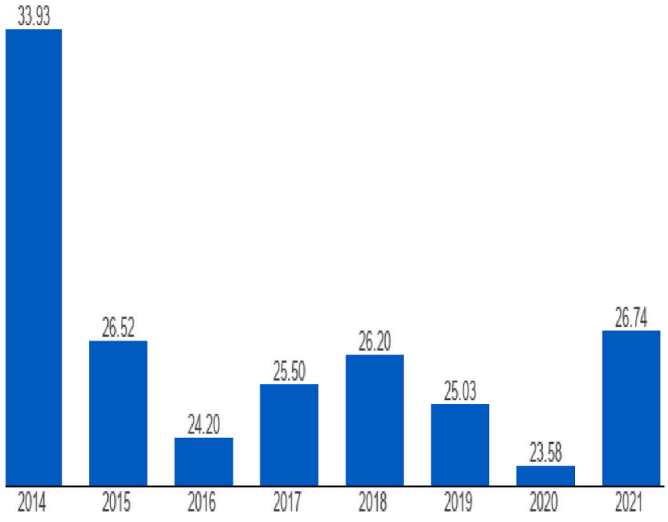

Fig. 1. *Norway Manufacturing value added, billion USD.*

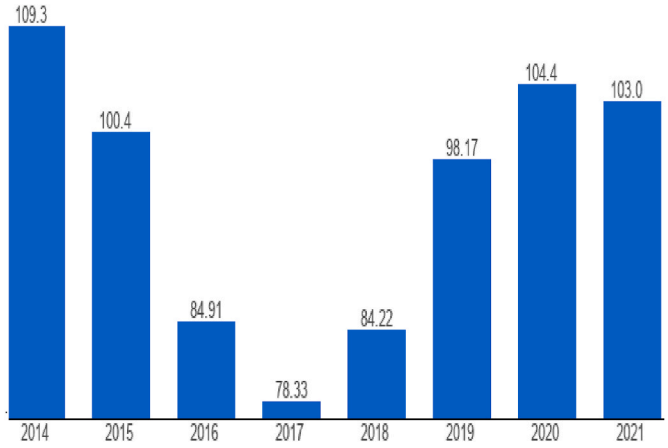

Fig. 2. *Nigeria Agriculture value added, billion USD.*
Sources: The Global economy.com

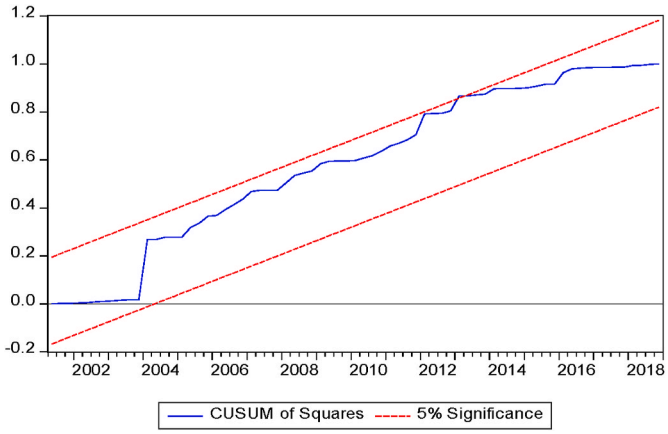

Fig. 3. CUSUM and CUSUM square residual graphical plots.

currency and increase in the prices of the factors of production. As a result, the available resource in the domestic economy will move away from the traditional sectors (agriculture and manufacturing sectors) to the booming sectors because of the attractiveness of the prices offered to them by the boom sector. This will cause decline in the productive activities of the producers including reduction in the output and contraction of the traditional sectors (Nyatepe-Coo, 1994). However, there are exceptional cases that resource movement is nonexistent. Situation where the booming sectors does not require the domestic factors due to the lack of expertise or application of only imported physical machines that does not amount to competing for the available laborer and machines in the domestic economies proves the nonexistent of resource movement (Farmadesh, 1991; Rudd, 1996). Also, the redundant and unemployed factors could be utilized by the boom sectors to execute productive ventures either as a short-term contract or unskilled productive activities. In this regard, the factors that are already with the traditional sectors are unaffected.

3. Modelling, methodology and data

Modelling of this study is based on the theoretical background of this study which is anchored on the Corden and Neary (1982) and Neary and Van Wijnbergen, (1986) views on Dutch disease theory. As noted in theory of this study, Dutch disease is a negative effect of the abundant natural resources on any country's economy through a spike in the value of the country's currency which encourages excessive import against export. Following the Dutch disease literature, a careful selection of

variables (such as agriculture and manufacturing sectors, economic growth proxied by GDP, government spending, real exchange, oil-price and FDI) is done for the justification of the estimated model in light of the literature. With regards to the nature of the study, comparing two economies (Norwegian and Nigerian), it is expected that the Dutch diseases will be evident on the bedrock of the economies before the boom of the resources. Before the advent of the resource boom, the two economies (Norway and Nigeria) have been dependent on manufacturing and agriculture respectively. The immediate effect of Dutch disease is on the traditional bedrock of any economy which are always manufacturing and agricultural sectors for the case of industrialized and developing economies. Theories of Dutch disease hinge on mechanisms of spending effect and resource movement effect in determining the effect of the Dutch disease on the non-resource sectors. The spending is mostly done by the government of the nation via the proceeds of the resources (oil in case of Norway and Nigeria). Government spending works along with the movement (fluctuation) of real exchange rate. Government spending is likely going to cause domestic income rise which will be met with sharp increase in domestic price level and this will be reflected on the real exchange rate. A negative relationship is expected between the government expenditure and the tradable sectors (non-resource sectors). However, it is discovered that most of developing countries including Nigeria print large amount of money to supplement financing of their expenditures, it is predicted that the value of the countries' currencies will depreciate while the real exchange rate increases which will impact positively on non-resource sector. Hence, the impact of real exchange rate on the non-resources sector is expected to be negative for the case of Norway and positive for the case of Nigeria. The performance and attraction of oil sector is likely to cause resource movement from other sectors to oil sector. The resources movement is seen from non-resource (agricultural and manufacturing) sectors to resource (oil) sector for the case of Nigeria and Norway respectively. Ideally, it would be novel to find wage statistics on each of both countries' oil sectors, but due to data constraints, oil price is adopted as proxy to resource movement. Also, considering the effect of world price as it concerns the oil production cost and the cost of importing oil which may likely affect cost of production in manufacturing and agricultural sectors, oil price is seen impacting negatively to non-resource sectors. In fact, oil price could be seen as a coordinating explanatory variable due to its multiplier or spill-over effect both on spending and resource movement effect. Some scholars consider this as international difference in production cost, and regard it as essential as both the spending and resource movement effects (Farmadesh, 1991). It is expected that foreign investors will be attracted to the country because of the availability of the resource thereby increasing foreign direct investment (FDI) of the country. The FDI could either be positive to the tradable goods sector due to its positive economic effects on the economy.

With insight from the above discussion, this study adopts log-linear specification to estimate and test the effect of government expenditure, real exchange rate, and FDI and oil price on the both agriculture and manufacturing sector for Nigeria and Norway respectively. For the purpose of comparing the two economies in separate manner, author chose to model the Dutch disease for the two countries separately with two different equations, one with agriculture for Nigeria and another model with manufacturing for the Norway. All series are transformed and expressed in natural log form except the series (agriculture, manufacturing and FDI) expressed on percentage to GDP already. The log-linear transformation is superior as compared to a simple linear specification (Shahbaz, 2010). Following the identified variables, the modelled equation is given as follows:

$$AG_t = \beta_0 + \beta_1 lnY_t + \beta_2 lnGE_t + \beta_3 FDI_t + \beta_4\ ln\ OP_t + \beta_5\ ln\ RER_t + \varepsilon_i \quad (1)$$

$$Manu_t = \beta_0 + \beta_1 lnY_t + \beta_2 lnGE_t + \beta_3 FDI_t + \beta_4 lnOP_t + \beta_5 lnRER_t + \varepsilon_i \quad (2)$$

From Eqns (1) and (2) (representing models for Nigeria and Norway respectively), AG_t and $Manu_t$ are the dependent variables (agriculture and manufacturing sectors) which account for the impact of Dutch disease indicators (government spending, real rate of exchange and oil price) according to the theory. Y_t represents the real per capita GDP proxied for economic growth, GE_t represents government expenditure proxied by general government final consumption expenditure, FDI_t represents foreign direct investment, net inflow, OP_t represents crude oil price, RER_t represents real exchange rate, and ε_i is normally distributed residual term.

Descriptive statistics is utilized in determining the normal distribution of the data through Jarque-Bera, Kurtosis and skewness. This research employs augmented Dickey-fuller (ADF, 1979 and 1981), Philip-perron, (1992) and Kwiatkowski et al. (1992) unit root test to examine the stationarity and order of integration among the selected variables. Short run and long run dynamics with Co -integration analysis were done with autoregressive distributed lag (ARDL) and bound test approach. The ARDL approach is adopted in this study considering its advantages over other multivariate and co integration methods such as vector error correction model and Johansen co integration tests. ARDL reduces the likelihood of multicollinearity problem because of the sensitivity and application of lag in the model. It is robust and suitable for a small sample size. Unlike other approaches, there are no strict criteria for adopting ARDL model, and it can be adopted where there mixed (level and first difference) order of integration of series except for the case of second difference- I(1). The modelling of the co -integration for the estimation of long run relationship among the variables in form of an unrestricted error correction model are as follows:

a. For Nigeria;

$$\Delta AG_t = \beta_1 + \beta_2 AG_{t-1} + \beta_3 lnY_{t-1} + \beta_4 lnGE_{t-1} + \beta_5 FDI_{t-1} + \beta_6\ ln\ OP_{t-1} + \beta_7\ ln\ RER_{t-1} + \sum_{i=0}^{n} a_1 \Delta AG_{t-i} + \sum_{j=0}^{o} a_2 \Delta lnY_{t-j} + \sum_{k=0}^{p} a_3 \Delta lnGE_{t-k} + \sum_{l=0}^{q} a_4 \Delta FDI_{t-l} + \sum_{m=0}^{r} a_5 \Delta lnOP_{t-m} + \sum_{n=0}^{s} a_6 \Delta lnRER_{t-n} + ECM_{t-i} + \mu_t \quad (3)$$

b. For Norway

$$\Delta Manu_t = \beta_1 + \beta_2 Manu_{t-1} + \beta_3 lnY_{t-1} + \beta_4 lnGE_{t-1} + \beta_5 FDI_{t-1} + \beta_6\ ln\ OP_{t-1} + \beta_7\ ln\ RER_{t-1} + \sum_{i=0}^{n} a_1 \Delta AG_{t-i} + \sum_{j=0}^{o} a_2 \Delta lnY_{t-j} + \sum_{k=0}^{p} a_3 \Delta lnGE_{t-k} + \sum_{l=0}^{q} a_4 \Delta FDI_{t-l} + \sum_{m=0}^{r} a_5 \Delta lnOP_{t-m} + \sum_{n=0}^{s} a_6 \Delta lnRER_{t-n} + ECM_{t-i} + \mu_t \quad (4)$$

equations (1) and (2) are constructed to investigate the existence of symmetric cointegration among the selected and already defined variables (*agricultural and manufacturing sector, real GDP* per capita*, government expenditure, foreign direct investment, oil price and real exchange rate*) for both countries (Nigeria and Norway). From the equations, the sign Δ denotes first difference of the variables, β_i and a_i represent the long-run and short-run parameters of the variables with i = 1, 2 … etc., while ECM_{t-i} represents the error correction model which reveals the speed of adjustment over a period of time termed long-run period.

Cointegration is estimated with bound test by calculating the F-stats, and compare the outcome with the values of critical bounds (lower and upper critical bounds) test. The distribution of F-stats as developed by Pesaran and Shin, (2008) and Pesaran et al. (2001) is not standardized with either integration at level I(0) or at differenced I(1). Unlike other cointegration approaches, bound approach of cointegration test is non conditional of a special way of integration, but accommodate either integration at level I(0), differenced I(1) or mixed integration. This is done with the expression of null hypothesis and alternative hypothesis on the basis that there is no cointegration. Cointegration exists if the

F-stats is greater than the values of the upper bounds. However, if the F-stats is less that the critical value of upper bound test, it means no cointegration existed, and when the F-start is in between upper and lower bound tests, it is inconclusive. The null and alternative are expressed for the two countries' (Nigeria and Norway) equations as follows; Null $= H_0$: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$, against the alternative $= H_a$: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$.

Granger causality estimation is equally utilized in this study for in-depth and robust analysis. After cointegration is established, author proceeds with the granger causality on the basis that causal relationship is expected at least from one direction. Granger acknowledged that the existence of cointegration among the variables exposes long -run and short-run granger causality. Considering the mixed integration that existed among the variables, Authors applied vector autoregressive (VAR) model and vector error correction model (VECM) for testing the direction of causality among the selected variables for both countries, and the error correction. Hence, authors build on vector error correction representation in matrix form for the two countries as following:

a. For Nigeria

$$(1-L)\begin{bmatrix} AG_t \\ lnY_t \\ lnGE_t \\ FDI_t \\ ln\ OP_t \\ ln\ RER_t \end{bmatrix} = \begin{bmatrix} \varnothing_1 \\ \varnothing_2 \\ \varnothing_3 \\ \varnothing_4 \\ \varnothing_5 \\ \varnothing_6 \end{bmatrix} + \sum_{i=1}^{p}(1-L)\begin{bmatrix} a_{11i} & a_{12i} & a_{13i} & a_{14i} & a_{15i} & a_{16i} \\ \beta_{21i} & \beta_{22i} & \beta_{23i} & \beta_{24i} & \beta_{25i} & \beta_{26i} \\ \delta_{31i} & \delta_{32i} & \delta_{33i} & \delta_{34i} & \delta_{35i} & \delta_{36i} \\ \partial_{41i} & \partial_{42i} & \partial_{43i} & \partial_{44i} & \partial_{45i} & \partial_{46i} \\ \gamma_{51i} & \gamma_{52i} & \gamma_{53i} & \gamma_{54i} & \gamma_{55i} & \gamma_{56i} \\ \rho_{61i} & \rho_{62i} & \rho_{63i} & \rho_{64i} & \rho_{65i} & \rho_{66i} \end{bmatrix} + \begin{bmatrix} \theta \\ \vartheta \\ \tau \\ \varphi \\ \omega \\ \in \end{bmatrix} ECM_{t-1} + \begin{bmatrix} \eta_{1t} \\ \eta_{2t} \\ \eta_{3t} \\ \eta_{4t} \\ \eta_{5t} \\ \eta_{6t} \end{bmatrix} \quad (5)$$

b. For Norway

$$(1-L)\begin{bmatrix} Manu_t \\ lnY_t \\ lnGE_t \\ FDI_t \\ ln\ OP_t \\ ln\ RER_t \end{bmatrix} = \begin{bmatrix} \varnothing_1 \\ \varnothing_2 \\ \varnothing_3 \\ \varnothing_4 \\ \varnothing_5 \\ \varnothing_6 \end{bmatrix} + \sum_{i=1}^{p}(1-L)\begin{bmatrix} a_{11i} & a_{12i} & a_{13i} & a_{14i} & a_{15i} & a_{16i} \\ \beta_{21i} & \beta_{22i} & \beta_{23i} & \beta_{24i} & \beta_{25i} & \beta_{26i} \\ \delta_{31i} & \delta_{32i} & \delta_{33i} & \delta_{34i} & \delta_{35i} & \delta_{36i} \\ \partial_{41i} & \partial_{42i} & \partial_{43i} & \partial_{44i} & \partial_{45i} & \partial_{46i} \\ \gamma_{51i} & \gamma_{52i} & \gamma_{53i} & \gamma_{54i} & \gamma_{55i} & \gamma_{56i} \\ \rho_{61i} & \rho_{62i} & \rho_{63i} & \rho_{64i} & \rho_{65i} & \rho_{66i} \end{bmatrix} + \begin{bmatrix} \theta \\ \vartheta \\ \tau \\ \varphi \\ \omega \\ \in \end{bmatrix} ECM_{t-1} + \begin{bmatrix} \eta_{1t} \\ \eta_{2t} \\ \eta_{3t} \\ \eta_{4t} \\ \eta_{5t} \\ \eta_{6t} \end{bmatrix} \quad (6)$$

From equations (5) and (6), $(1-L)$ represents the difference operator, while ECM_{t-1} is the lagged error correction term derived from the long-run cointegration relationship, and the notations represented with η_{1t} …… … … η_{6t} are serially independent random errors with mean zero and finite covariance matrix. The evidence on the direction of the causal relationship that existed in the short-run is shown in the 1st differences of the variables, while the causal relationship in the long-run is determined by a significant level of either p-value or t-stats on the error correction term (ECM_{t-1}).

This study applied quarterly (1992Q1-2018Q4 and 1992Q1-2019Q4) data for the selected variables (*agricultural and manufacturing sector, real GDP* per capita, *government expenditure, foreign direct investment, oil price and real exchange rate*) amounted to 107 and 110 observations for both countries (Nigeria and Norway). The data are sourced from the 2018 updated World Bank development indicator.

4. Empirical results and discussions

4.1. Descriptive statistics

The result of the descriptive statistics for both countries are displayed in Tables 1 and 2 with evidence of normally distributed data as shown with the probability of the Jarque-Bera established non-significant except for the cases of FDI for both countries and RER for Nigeria.

4.2. Unit root test

Having ascertained the normality of data with regards to distribution, author proceeds with the unit root tests. Basically, times series data are characterized with unstable variables because of the intermediate shocks that are usually caused by the structural events in an economy. These events are majorly macroeconomic events such as inflation, recession, deflations and natural disaster or outbreak of epidemic and pandemics. Most times, the shocks from these events affects the economic performance of a country negatively. Examples of such macroeconomic shocks are 2009 global financial meltdown, volatility in the price of oil and its supply, the current outbreak of COVID-19 etc. Following the disruption caused by these macroeconomic events, it is expected that variables selected for research into such economy are not stationary or stable. For this reason, unit root test is required so as to accommodate these events in any research. For this purpose, author applied a combination of three approaches (Dickey and Fuller, 1979; Philip-perron, 1992 and Kwiatkowski-Phillips-Schmidt-Shin (KSS, 1992) in determining the stationarity and order of integration among the variables. Though, the application of ARDL bound test by the author for cointegration does not segregate among the order of integration (I (0), I (1) or mixed) but objects the order of I (2). Hence, the findings of the unit root test according to the adopted approaches in this study display mixed order of integration with exemption of I(2) for the case of both countries (Nigeria and Norway), and the results are shown in Tables 3 and 4 below.

4.3. Co -integration and long run analysis

After the arrival of mixed order of integration, the present study adopts ARDL bound test for accurate estimation and analysis of co-integration. As noted, the ARDL bound test of Pesaran et al. (2001) does not require any special order of integration for the convenience of estimating. Hence, it is utilized in estimating the cointegration and determination of the existence of long run relationship between the selected variables (agricultural and manufacturing sector, GDP per capita, government expenditure, real exchange rate, FDI, and crude oil price) for Nigeria and Norway for the period of 1992Q1-2018Q4 and 1992Q1-2019Q4 respectively.

Before the estimation of the cointegration, it is important to select the appropriate lag length of the variables. This is because of the sensitivity of the F-stats to lag order. The lag length is calculated with VAR and the result appears with outputs of different approaches such as

Table 1
Summary of statistics (for Nigeria).

	AGRIC	FDI	GDP	GGFCE	OIL_PRICE	RER
Mean	6.48E+	1.754	1891.3	1.41E+	51.07	109.0
Median	6.33E+	1.608	1857.9	1.05E+	44.53	100.0
Maximum	1.19E+	5.791	2563.9	3.36E+	114.2	272.9
Minimum	2.39E+	0.502	1348.7	1.49E+	12.62	49.73
Std. Dev.	3.40E+	1.193	456.8	1.28E+	33.68	51.39
Skewness	0.171	1.888	0.136	0.288	0.610	1.810
Kurtosis	1.541	6.774	1.381	1.338	2.068	5.934
Jarque-Bera	2.714	34.43	3.256	3.607	2.851	26.24
Probability	0.257	0.000	0.196	0.165	0.240	0.000

Source: Authors computation

Table 2
Summary of statistics (for Norway).

	MAN	GDPC	GGFCE	FDI	RER	OIL-Price
Mean	8.341	3.94E+11	8.12E+10	2.097	94.18	50.05
Median	8.299	4.09E+11	8.03E+10	2.066	94.20	43.73
Maximum	10.80	4.95E+11	1.07E+11	6.187	100.45	111.6
Minimum	5.899	2.63E+11	5.53E+10	−5.062	83.70	12.72
Std. Dev.	1.545	6.84E+10	1.57E+10	2.296	5.307	32.65
Skewness	0.046	−0.397	0.044	−0.853	−0.642	0.604
Kurtosis	1.595	2.069	1.782	4.675	2.246	2.072
Jarque-Bera	2.395	1.810	1.802	6.906	2.680	2.804
Probability	0.302	0.404	0.406	0.032	0.262	0.246

Source: Authors computation

Table 3
Stationarity test (for Nigeria).

Variables	@ LEVEL		1st Diff		Decision
	With intercept	intercept & trend	With intercept	intercept & trend	
PP					
AGR	−2.371	−2.619	−5.147***	−5.152***	I(1)
LGDP	−0.384	−1.613	−3.538***	−3.539***	I(1)
LGE	−0.752	−1.718	−4.483***	−4.473***	I(1)
FDI	−2.645*	−2.919	−5.106***	−5.080***	MIXED
LOP	−1.504	−1.700	−4.834***	−4.820***	I(1)
LRER	−2.343	−2.345	−5.134***	−5.093***	I(1)
ADF					
AGR	−1.893	−2.674	−3.694***	−3.736**	I(1)
LGDP	−0.816	−2.686	−2.208	−2.184	I(1)
LGE	−0.921	−2.736	−1.955	−1.886	I(1)
FDI	−5.423***	−2.963	−3.318**	−3.493**	MIXED
LOP	−1.544	−1.554	−3.037**	−3.105	I(1)
LRER	−3.322**	−3.448*	−2.972**	−2.972	MIXED
KPSS					
AGR	0.395*	0.203**	0.062	0.037	
LGDP	1.158***	0.167**	0.234	0.228***	
LGE	0.971***	0.138*	0.111	0.109	
FDI	0.316	0.077	0.043	0.039	
LOP	0.860***	0.142*	0.107	0.082	
LRER	0.087	0.080	0.057	0.056	

Notes: a: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%(b): P-value according to (1) Maclean et al., (1996) one-sided p-values (2) Kwiatkowski et al. (1992).

sequential modified LR test stats (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn Information Criterion (HQ). The lag length as identified by AIC is considered appropriate in making the decision of lag selection in this study. This is because of its superior and consistent characteristics compared to other criteria (Shahbaz and Rahman, 2012). The optimal lag selected for this study according to AIC is 5 for both countries. The result will be made available on request.

Cointegration output as estimated with F-stats for both countries are reported in Tables 5 and 6. The empirical evidences from this test (Bound testing) validate the existence of cointegration with F-stats (10.28172) and critical value (4.587) of upper bound for Nigeria, and F-stats (4.980) and critical value (4.587) of upper bound for the case of Norway respectively. This confirms the existence of long run relationship between agriculture sector (AGR), economic growth (GDP per capita), government expenditure (GE), foreign direct investment (FDI), real exchange rate (RER), and crude oil price (OP) for the case of Nigeria, and between manufacturing sector (MANU), economic growth (GDP per capita), government expenditure (GE), foreign direct investment (FDI), real exchange rate (RER), and crude oil price (OP) for the case of Norway.

Table 4
Stationarity test (for Norway).

Variables	@ LEVEL		1st Diff		Decision
	With intercept	intercept & trend	With intercept	intercept & trend	
PP					
MANU	−0.646	−2.729	−4.902***	−4.865***	I(1)
LGDP	−2.278	−1.674	−4.603***	−4.779***	I(1)
LGE	−0.376	−3.011	−4.625***	−4.559***	I(1)
FDI	−2.201	−2.185	−6.127***	−6.136***	I(1)
LOP	−1.511	−1.746	−4.813***	−4.798***	I(1)
LRER	−0.951	−0.966	−4.962***	−4.988***	I(1)
ADF					
MANU	−0.749	−2.386	−3.359**	−3.235*	I(1)
LGDP	−2.015	−2.678	−2.278	−2.757	I(1)
LGE	0.279	−4.568***	−4.621***	−4.581***	I(1)
FDI	−3.469**	−3.229*	−0.744	−0.365	I(1)
LOP	−1.544	−1.576	−3.050**	−3.115	I(1)
LRER	−0.744	−0.966	−3.107**	−3.358*	I(1)
KPSS					
MANU	1.209***	0.109	0.085	0.084	
LGDP	1.234***	0.266***	0.403*	0.077	
LGE	1.269***	0.074	0.039	0.040	
FDI	0.232	0.216**	0.110	0.103	
LOP	0.867***	0.141*	0.103	0.082	
LRER	0.288	0.214**	0.176	0.075	

Notes: a: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1% (b): P-*value according to (1) Maclean et al., (1996) one-sided p-values (2)* Kwiatkowski et al. (1992,).

Table 5
Cointegration (ARDL) of AGRIC model (for Nigeria) [1992Q1- 2018Q4/107 OBSERV].

Variables	Coefficients	SE	t-statistics	P-value
Short-path				
D(LGDP)	0.049	0.005	9.335	0.000***
D(LGE)	−1.07E-10	5.94E-11	−1.803	0.075*
D(FDI)	0.517	0.162	3.202	0.002***
D(LOP)	−0.052	0.012	−4.307	0.000***
D(LRER)	0.002	0.005	0.454	0.650
CointEq(-1)*	−0.200	0.023	−8.813	0.000***
Long-path				
LGDP	0.048	0.006	7.835	0.000***
LGE	−1.07E-10	6.45E-11	−1.662	0.101
FDI	0.5172	0.186	2.783	0.007***
LOP	−0.052	0.014	−3.683	0.000***
LRER	0.002	0.005	0.413	0.681
Constant	1.242	0.299	4.142	0.000***
R^2	0.988			
Adj.R^2	0.983			
D.Watson	1.862			
Bound test(Long-path)				
F-statistics	10.282***	K = 5,@ 1%	I(0)bound = 3.351	I(1)bound = 4.587
Wald test(short-path)				
F-statistics	203.7***			
P-value	0.000***			
Serial Correlation test				
F-statistics	0.573			
Chi-square	1.633			
P-value	0.566			
Heteroscedasticity Test				
F-statistics	0.764			
Chi-square	24.79			
P-value	0.793			

Note: *, **, *** Denotes rejection of the null hypothesis at the 1%, 5% and 10%.
Sources: Authors computation

Table 6
Cointegration (ARDL) of MANU model (for Norway) [1992Q1- 2019Q4/110 OBSERV].

Variables	Coefficients	SE	t-statistics	P-value
Short-run				
D(LGDP)	−2.29E-11	6.43E-12	−3.560	0.000***
D(LGE)	−7.70E-11	1.95E-11	−3.944	0.000***
D(FDI)	0.031	0.008	4.057	0.000***
D(LOP)	−0.008	0.002	−4.079	0.000***
D(LRER)	−0.002	0.003	−0.580	0.563
CointEq(-1)*	−0.286	0.047	−6.100	0.000***
Long-run				
LGDP	−2.29E-11	8.28E-12	−2.764	0.007***
LGE	−7.70E-11	1.95E-11	−3.944	0.000***
LFDI	0.031	0.009	3.583	0.001***
LOP	−0.008	0.002	−3.434	0.001***
LRER	−0.002	0.003	−0.580	0.563
Constant	1.964	0.405	4.853	0.000***
R^2	0.998			
Adj.R^2	0.997			
D.Watson	2.023			
Bound test(Long-path)				
F-statistics	4.980***	K = 5,@ 1%	I(0)bound = 3.351	I(1)bound = 4.587
Wald test(short-path)				
F-statistics	1937.9***			
P-value	0.000***			
Serial Correlation test				
F-statistics	0.076			
Chi-square	0.192			
P-value	0.909			
Heteroscedasticity Test				
F-statistics	0.778			
Chi-square	16.36			
P-value	0.694			

Note: *, **, *** Denotes rejection of the null hypothesis at the 1%, 5% and 10%.
Sources: Authors computation

Diagnostics tests were carried on this analysis in avoidance of spurious regression and analysis. Diagnostics tests aided the two models for both countries to pass the classical assumptions with regards to normality of error term, serial correlation, autoregressive conditional heteroscedasticity, white heteroscedasticity, and functional form of the two models. The results of the diagnostic tests appear at the lower segment of each Tables 5 and 6 showing the error term normally distributed, absence of serial and autocorrelations, absence of problem of heteroscedasticity. Also, the stability of the models are tested and confirmed with recursive tests (cusum and cusum squared). The results as they appeared in Figs. 4, 5 and 6 showed the stability of the selected models with blue lines well bounded with the red line at the 0.05 significance level. Results of long run and short run analyses are equally displayed in Tables 5 and 6 with the values of error correction models

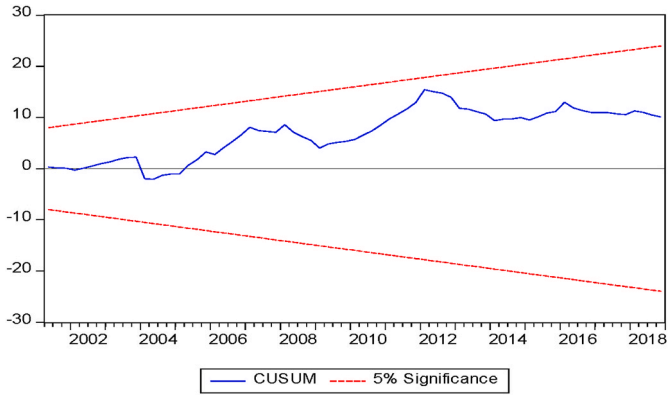

Fig. 4. CUSUM and CUSUM square residual graphical plots.

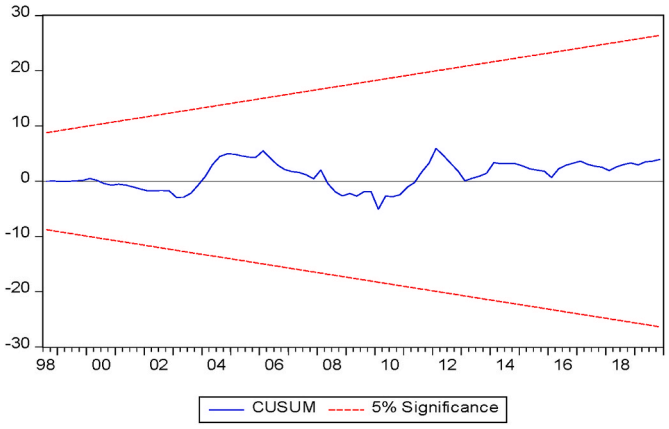

Fig. 5. CUSUM and CUSUM square residual graphical plots.

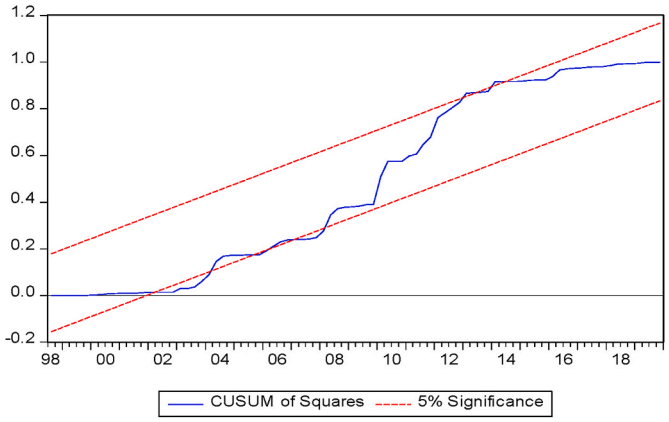

Fig. 6. CUSUM and CUSUM square residual graphical plots.

(ECM) from the two models showing negative coefficients (−0.200179; −0.285845) and significant at 1 percent level respectively. The negative signs with significance of the error correction model (ECM) from the two models support the long run relationship between the selected variables as already established with cointegration. This suggests the ability of the models (Nigeria and Norway models) to correct the short run disequilibrium in the long run at the rate of 20 percent and 28 percent respectively.

After the findings for cointegration and the diagnostic tests, the next step is to analyze the long run and short run impact of the selected Dutch disease (explanatory) variables on the dependent variables (agriculture and manufacturing industries) for both countries. The findings are displayed in Tables 5 and 6 and analysis are presented separately for the two countries.

First, we consider the findings of both the long run and short run for Nigeria as following: a positive with significant level relationship is found between economic growth (real GDP per capita) and agriculture in both short and long run. Statistically, a percentage increase in economic growth will lead to 0.048374 increase in agricultural sector. Considering the structure of Nigeria economy of which agriculture is part of the dominant sectors towards sustenance and export value-added to the economy, with the increase in economic growth as it will definitely reflates on the agricultural sector in a positive manner through a spillover effect. The economic growth is assumed to have attracted foreign investors and technological advancement via importation of improved machineries that can impact the agricultural practices in the Nigeria and this will tend toward positive growth of agricultural sector. Also, as the income per capita increases, the country develops and devotes more attention to manufactures which equally include agro-allied

products and industries. Though, this is attributed to industrialization via increase in per capita income but it has a spillover effect towards the improvement of agricultural sector. Hence, the increase in GDP per capita does not have static relationship with agriculture, it could either expand or contract. This finding is consistent with the findings of Sertoglu et al. (2017); Lawal (2011).

A negative and significant (only in short run) relationship is found between government expenditure and agriculture in both short run and long run (insignificant). A one percent increase in government spending will lead to a 1.07E-10 (−0.000000000107) contraction of the Nigerian agricultural sector in both short run and long run. This is in line with the Dutch disease theory with regards to spending effect. Hence, a negative relationship is expected between the government expenditure and the tradable sectors (non-resource sectors). Government spending works along with the movement (fluctuation) of real exchange rate. As established in the theory section, Government spending is likely going to cause domestic income rise which will be met with sharp increase domestic price level and this will be reflected on the real exchange rate. This will definitely discourage the patronage to the non-oil sector which is agricultural sector in the case of Nigeria because of the increase in the price. Though, this is insignificant in the short run but significant in the long run, it is not separated from the fact that the value of the currency is still not revived. This finding supports the findings of Westin (2004); Oomes and Kalcheva, (2007); Gelb and Associate (2008); Hasanov (2013).

A positive and significant relationship between foreign direct investments (FDI) and agriculture is found both in short run and long run. A percent increase in FDI is expected to increase the agricultural sector of Nigeria by 0.517181. This is expected of this research considering the spillover effect of foreign direct investment in any economy. Most times, FDI is attracted by the availability of resources in the economy but with interconnections in the economy its benefits is spread across the entire economy. This is witnessed through transferring of knowledge and skill, and availability of capitals in terms machines to enhance the productivity of other sectors. This finding is consistent with the findings of Owutuamor and Arene (2018); Msuya, (2007); Slimane et al. (2016).

A negative and significant relationship is found between the crude oil price and agricultural sector of Nigeria. This supposes that oil price serving as a proxy of oil sector has significant negative impact on the agricultural sector. Quantitatively, a percent increase in oil price will lead to −0.051698 contraction of the agricultural sector both in short and long run respectively. This is in line with the theory and authors expectation and supports the finding by Hasanov (2013). Also, considering the effect of world price as it concerns the oil production cost and the cost of importing oil which may likely affect cost of production in manufacturing and agricultural sectors, oil price is seen impacting negatively to non-resource sectors (agricultural sectors). As stated before, oil price could be seen as a coordinating explanatory variable due to its multiplier or spill-over effect both on spending and resource movement effect. It is sometimes considers as international difference in production cost, and regard it as essential as both the spending and resource movement effects (Farmadesh, 1991).

However, a positive but insignificant relationship is established between rate of exchange rate and agricultural sector of Nigeria. Though, this contrasts the original theory of Dutch (Rudd, 1996) which was tested for the case of Netherland because the currency appreciate, but this is in line with the authors expectations concerning the case of Nigeria or any developing country. As noted from the modelling section, it is discovered that most of developing countries including Nigeria print large amount of money to supplement financing of their expenditures, this action is predicted to impact on the value of the countries' currencies with depreciation while the real exchange rate increases which will impact positively on non-resource sector (agriculture). Hence, the impact of real exchange rate on the non-resources sector is expected to be positive for the case of Nigeria. A percent increase in exchange rate will increase the agriculture by 0.002156 and 0.002156 both in short run and long run respectively.

For the case of Norway, the following findings were made from empirical estimations of the country's (Norway) data: A statistically significant negative relationship is found between the economic growth and the Norway's manufacturing sector. This might sound uncommon but it has been confirmed that manufacturing sectors of most European economies (countries) have shown some level of significant decline since early 1970s (Rodriguez, et al., 2017), though without evidence of factor causing the contraction. Again, most times, money supply is found positively perfectly correlated with real GDP, this could mean that as the country (Norway in this case) GDP grows the money supply also increases leading to contraction of the manufacturing sector. From the estimate, it could be ascertained that as the Norwegian Kroner increases in real GDP, it will lead to 0.0000000000229 (−2.29E-11) decrease in manufacturing contribution to non-oil GDP. Moreover, one can think of the percentage input of manufacturing sector to the GDP growth of Norway after separating the oil percentage input, it will be no doubt less than the oil sector's contribution. This finding supports the findings by Rodriguez, et al., (2017).

A statistically significant negative relationship is found between manufacturing sector and government expenditure. This finding support both the author's expectation and the spending effect of Dutch disease theory irrespective of the developing nature or level of the country. As the government embark on spending the oil revenue, it will cause a rise in the income level of the country which will reflect on the price of the domestic goods gotten from non-resource (manufacturing) sector. This will impact on the exchange rate of the country thereby causing the currency to appreciate for the case of developed country (Norway). This will deter the buyers of the product thereby leading to the contraction of the manufacturing sector. Hence, a percent increase in government spending will lead to 0.0000000000770 (−7.70E-11) contraction of the manufacturing sector both in short run and long run periods respectively. This finding supports the spending effect of Dutch disease and in consistence with the findings made by Westin (2004); Oomes and Kalcheva, (2007); Gelb and Associate (2008); Hasanov (2013).

However, a significantly positive relationship is found between FDI and the Norwegian manufacturing sector both in short run and long run. FDI could be either positive or negative depends on the efficient policies on ground to mitigate its effects. Also, as mentioned from the case of Nigeria, FDI has a way of impacting the economy generally through its spillover effects. The presence of foreign investors in the economy could impact positively on the interested sectors asides the oil sector. Hence, a percent increase in FDI will lead to 0.031392 increase in the Norwegian manufacturing sector both in short run and long run. This supports the findings from Owutuamor and Arene (2018); Msuya, (2007); Slimane et al. (2016).

Significant negative relationship is found between oil price and Norway's manufacturing sector, and also between real exchange rate and Norway's manufacturing sector. Statistically, a percent increase in oil price and in real exchange rate will contract Norwegian manufacturing sector by −0.008410 and −0.001941 respectively in both short run and long run. Negative relationship between oil price and manufacturing sector is in line with the theory and authors hypothetical expectation. The justification on this relationship can be drawn from the Nigeria result which provided evidence of same negative relationship. Oil price as a proxy to oil sector had statistically significant negative impact on Norwegian manufacturing sector. Oil price is a very sensitive parameter in studying impact of oil sector and Dutch diseases when its multi-dimensional effects is considered. It poses as a variable to measure world price with regards to oil production cost and cost of importing oil, and resources movement effects (Farmadesh, 1991). Oil price could possibly impact manufacturing sector negatively through cost of importing oil use in manufacturing activities which impacts the cost of production in manufacturing sector. Also, a drain of workers from manufacturing sector is possible when oil sector is considered juicy for workers. This supports the finding by Hasanov (2013). Also, the findings

of the relationship between real exchange rate and Norwegian manufacturing sector is in line with the Dutch disease theory and supports author's hypothetical expectation. According to the theory, it is expected that real exchange rate will be impacted through the government spending. Increase in general income and rice in domestic price will cause the Norwegian Kroner to appreciate against the foreign currencies, and this will cause the demand of products from the Norwegian manufacturing sector to decrease which will definitely contract the non-oil (manufacturing) sector. This supports the findings by (Rudd, 1996).

4.4. Granger causality

Granger causality estimation is equally utilized in this study for in-depth and robust analysis. After cointegration is established, author proceeds with the granger causality on the basis that causal relationship is expected at least from one direction. Vector autoregressive (VAR) model and vector error correction model (VECM) were adopted for testing the direction of causality among the selected variables for both countries, and the error correction. The empirical result of the granger causality for Nigeria and Norway are displayed in Tables 7 and 8. From the result, we find for Nigeria a unidirectional causal transmission between economic growth and FDI, oil price, real exchange rate. Unidirectional causality is found between oil price and government spending, bi-directional causal relationship is found between oil price and economic growth. Also, bi-directional causal relationship exist between real exchange rate and FDI.

However, the findings from granger causality result of Norway are as follows: unidirectional causal relationship is found between manufacturing and government spending, between government spending and FDI, oil price and real exchange rate, between oil price and FDI and real exchange rate, and between real exchange rate and FDI. Bi-directional causal relationship is found between economic growth and FDI. With the interactions of the Dutch diseases variables (government spending, oil price, FDI and real exchange rate) from these granger causality findings, evidence of Dutch disease is established in both countries which support author's hypothesis.

5. Concluding summary and policy discussion

This is a comparative and research study with focus in comparing two oil-based resource economies, Norway and Nigeria. Comparing the two economies is based on the establishing the existence of Dutch disease, and the efficient management of the revenue generated from the oil resource in other to lift the economy (Nigeria) lagging behind from Dutch diseases and maintain sustainable economic performance and growth. Norway and Nigeria are two economies at the both extreme (positive and negative) performance respectively notwithstanding being classified as two oil-resourced based economies with the same history of oil discovering. Norway is considered among the best economies of the world with stable macroeconomic performance, while Nigeria on the other hand is considered among the poor performing economies of the world. Comparing the two economies in the areas of resource (oil) impacts and the handling of the resources and its revenue will give insight to the operations of both countries, and for borrowing a leaf from the good performing economy (Norway) for correction measures on the side of poor performing economy (Nigeria).

Scientific approaches such as ARDL bound testing for cointegration and long run symmetric relationship, and granger causality test for the purpose of robust checking of ARDL outcomes and for forecasting the future impacts of the variables adopted in this research. In order to guide our focus on the specifics of this study, hypothetical statements are made pointing towards the possibility of arriving at Dutch disease in theoretical section of this study. The findings from the empirics give credence to the theoretical background of this study with consistency with other literature findings for both cases (Nigeria and Norway). Hence, the findings according to ARDL bound testing confirmed the existence of cointegration for Nigeria with the symmetric relationships (short and long run) that confirmed the existence of Dutch disease through government spending effect and oil price. Also, a positive with significant level relationship is found between economic growth (real GDP per capita), FDI, real exchange rate and agriculture. The findings for the Norway's case also confirmed the existence of Dutch disease through government spending effect, real exchange rate and oil price. However, a significantly positive relationship is found between FDI and the manufacturing sector both in short run and long run.

From granger causality findings, there is a clear exposition of nexus among the government spending, oil price, FDI and real exchange rate which shows implication of government spending and oil price in both studies. This is a pointer towards existence of Dutch disease in both countries but the question remains, why is the Norwegian economic ahead of Nigerian economy both in performance and growth. The answer is anchored on the efficient handling of the economy by the authorities of Norway. This is possible with the workable policies framed and implemented by the Norwegian authorities.

Thus, policy should be framed and equally drawn from Norway on how to alleviate the effects of Dutch diseases for the case of Nigeria. Even, when findings point towards the symptoms of Dutch disease for the case of Norway, the country is still measuring as among the best performing economies of the world. So, it will be right to frame the policies targeting better performance of Nigerian economy. Hence, records have it that Norway applied the policy of transparency of the revenue and its utilization in the country to ensure greater growth and

Table 7
VECM Granger causality analysis/Block Exogeneity Wald Tests (for Nigeria).

Variables	AGR	LGDP	LGE	FDI	LOP	LRER
AGR	√√	41.90	2.484	0.195	2.256	0.696
	√√	**[0.00]**	[0.11]	[0.65]	[0.13]	[0.40]
LGDP	0.496	√√ √√	0.056	1.379	4.125	0.072
	[0.48]		[0.81]	[0.24]	**[0.04]**	[0.79]
LGE	0.011	0.378	√√	0.686	8.045	0.523
	[0.91]	[0.53]	√√	[0.40]	**[0.00]**	[0.47]
FDI	0.214	19.39	0.321	√√	1.285	3.508
	[0.64]	**[0.00]**	[0.57]	√√	[0.25]	**[0.06]**
LOP	0.018	23.66	0.323	0.328	√√ √√	0.751
	[0.89]	**[0.00]**	[0.57]	[0.56]		[0.39]
LRER	0.346	24.87	1.957	4.710	5.226	√√ √√
	[0.56]	**[0.00]**	[0.16]	**[0.03]**	**[0.02]**	

Note: **Bolden figures** in brackets are the prob. that represent 10%, 5% and 1% significance resp. while the figures before the brackets are the Chi-squares (χ^2) = Chi-squares (χ^2) [p-values].

Table 8
VECM Granger causality analysis/Block Exogeneity Wald Tests (for Norway).

Variables	MANU	LGDP	LGE	FDI	LOP	LRER
MANU	√√	0.360	3.130	0.659	0.318	6.961
	√√	[0.84]	[0.21]	[0.72]	[0.85]	**[0.03]**
LGDP	2.003	√√	20.09	4.964	2.674	0.875
	[0.37]	√√	[0.00]	**[0.08]**	[0.26]	[0.65]
LGE	8.622	4.120	√√	1.870	3.733	2.508
	[0.01]	[0.13]	√√	[0.40]	[0.16]	[0.29]
FDI	1.150	9.563	8.135	√√	4.837	5.328
	[0.56]	**[0.00]**	**[0.02]**	√√	**[0.09]**	**[0.07]**
LOP	0.078	0.189	9.595	2.516	√√	2.916
	[0.96]	[0.91]	**[0.01]**	[0.28]	√√	[0.23]
LRER	2.897	0.275	15.03	0.174	9.516	√√
	[0.23]	[0.87]	**[0.00]**	[0.92]	**[0.00]**	√√

Note: **Bolden figures** in brackets are the prob. that represent 10%, 5% and 1% significance resp. while the figures before the brackets are the Chi-squares (χ^2) = Chi-squares (χ^2) [p-values].

development. Two major ways Norway stabilized her economy are by sterilization of part of the revenue generated from the oil resources without allowing it flow fully into domestic economy. This is done by creating a separate account for the sterilized funds. Another way is by efficient utilization of the sterilized fund by channeling them into capital projects with intention of reviving and boosting the country's other sectors. This will create room for diversification of the country's economy to lessen heavy reliance on oil sector. The authorities of the country (Norway) strictly adhere to government control in setting up rules, guidelines and monitoring procedures in utilizing the revenue. The mentioned policies worked for the country because the Norway's government did not compromise in their duties and function. Nigeria government can replicate these policies in effort to alleviate the problem of Dutch disease and better the lives of the masses through sustainable development. Sterilization of part of the oil revenue and channeling into capital projects will help in economic development of Nigeria which will help to better the lives of her citizens and masses. Most of Nigeria's external debts are targeted on embarking on capital projects such as building roads, railways and bridges, manufacturing plants, power plant construction, power transmission, and electrical distribution which will impact the socioeconomic and enhance the standard of living of the people. Nigeria is considered as a mono-economy country, that is, a country that relies on production and exportation of one product (crude oil). About 80 percent of her export revenue and reserve are from crude oil. A careful handling of the sterilized fund is capable of revamping the Nigeria economy through decentralizing the economy. This could be achieved by channeling the fund from the oil towards reviving and exploration of other mineral deposits and sectors of the economy. In general, the recycling of the sterilized fund will create job opportunities and reduce poverty and crime rate in the country. The Dutch disease of Nigeria can be managed through the monetary and fiscal policies either by reducing money supply through open market operation or by reducing the money circulation through budget surplus.

Conclusively, as good as the policies are, they will probably take some time say a decade to experience same level of prosperity like Norway. In essence, it is called for a long time strategy to achieve this goal. Moreover, poor performing oil resourced countries can as well see this study and its findings as an eye opener towards better economic performance by borrowing from the highlighted policies in this study. This present study has some limitations with respect to variable and methodology selections. Some sensitive and vital variables such as government as measured by institutional quality and political instability are missing from the modeling of this scientific study, and this has made it possible for this topic to still remain open for further research. Further studies on this topic are encouraged with variables like institutional quality and political instabilities especially for the case of developing countries.

Compliance with ethical standards

Authors wish to inform the Editor/Journal that there are no conflicts of interest at any level of this study.

Authors' contributions

The paper is written by Qiwen ZHANG, and Edmund Ntom UDEMBA. While Qiwen and Edmund conceived and discussed the idea, Edmund compiled the introduction and literature review. Qiwen sourced the data and compiled the methodology and result discussion sections, Edmund wrote the conclusion and policy recommendation.

We hereby declare that no conflict of interest exist amongst the authors.

Data availability

Data will be made available on request.

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References

Balsalobre-Lorente, D., Shahbaz, M., Roubaud, D., Farhani, S., 2018. How economic growth, renewable electricity and natural resources contribute to CO2 emissions? Energy Pol. 113, 356–367.
Bjerkholt, O., Gjelsvik, E., Olsen, Ø., 1990. The Western European gas market: deregulation and supply competition. In: Recent Modelling Approaches in Applied Energy Economics. Springer, Dordrecht, pp. 3–28.
Corden, W.M., Neary, J.P., 1982. Booming sector and de-industrialisation in a small open economy. Econ. J. 92 (368), 825–848.
Dickey, D.A., Fuller, W.A., 1979. Distribution of the estimators for autoregressive time series with a unit root. J. Am. Stat. Assoc. 74 (366a), 427–431.
Erum, N., Hussain, S., 2019. Corruption, natural resources and economic growth: evidence from OIC countries. Resour. Pol. 63, 101429.
Ezeala - Harrison, F., 1993. Structural re - adjustment in Nigeria: diagnosis of a severe Dutch disease syndrome. Am. J. Econ. Sociol. 52 (2), 193–208.
Farmadesh, M., 1991. Dutch Disease Economics and the Oil Syndrome: World Development.
Hasanov, F., 2013. Dutch disease and the Azerbaijan economy. Commun. Post Commun. Stud. 46 (4), 463–480.
Haseeb, M., Kot, S., Hussain, H.I., Kamarudin, F., 2020. The natural resources curse-economic growth hypotheses: Quantile–on–Quantile evidence from top Asian economies. J. Clean. Prod. 279, 123596.
Herendeen, R., Tanaka, J., 1976. Energy cost of living. Energy 1 (2), 165–178.
Kalcheva, K., Oomes, N., Kalcheva, K., 2007. Diagnosing Dutch Disease: Does Russia Have the Symptoms?, No. 07/102. International Monetary Fund, Washington.
Kwiatkowski, D., Phillips, P.C., Schmidt, P., Shin, Y., 1992. Testing the null hypothesis of stationarity against the alternative of a unit root. J. Econ. 54 (1–3), 159–178.
Lawal, W.A., 2011. An analysis of government spending on agricultural sector and its contribution to GDP in Nigeria. Int. J. Bus. Soc. Sci. 2 (20).
Lenzen, M., 1998. Primary energy and greenhouse gases embodied in Australian final consumption: an input–output analysis. Energy Pol. 26 (6), 495–506.
Mehlum, L., 2008. Hjelp ved psykososiale kriser. Tidsskrift for den Norske legeforening 128 (18), 2048.
Munksgaard, J., Wier, M., Lenzen, M., Dey, C., 2005. Using input-output analysis to measure the environmental pressure of consumption at different spatial levels. J. Ind. Ecol. 9 (1-2), 169–185.
Nyatepe-Coo, A.A., 1994. Dutch disease, government policy and import demand in Nigeria. Appl. Econ. 26 (4), 327–336.
Owutuamor, Z.B., Arene, C.J., 2018. The impact of foreign direct investment (FDI) on agricultural growth in Nigeria (1979-2014). Review of Agricultural and Applied Economics (RAAE) 21 (1340–2018-5169), 40–54.
Pesaran, M.H., Shin, Y., Smith, R.J., 2001. Bounds testing approaches to the analysis of level relationships. J. Appl. Econ. 16 (3), 289–326.
Rodriguez, I. U., Bakken, T. M., & Martinez-Correa, J. Dutch DISEASE an Empirical Analysis of Norway's Success and Venezuela's Stagnation.
Rudd, C.D., 1996. An Empirical Analysis of Dutch Disease: Developing and Developed Countries.
Sachs, J.D., Warner, A.M., 2001. The curse of natural resources. Eur. Econ. Rev. 45 (4–6), 827–838.
Sertoglu, K., Ugural, S., Bekun, F.V., 2017. The contribution of agricultural sector on economic growth of Nigeria. Int. J. Econ. Financ. Issues 7, 547–552.
Shahbaz, M., 2010. Income inequality-economic growth and non-linearity: a case of Pakistan. Int. J. Soc. Econ.
Shahbaz, M., Rahman, M.M., 2012. The dynamic of financial development, imports, foreign direct investment and economic growth: cointegration and causality analysis in Pakistan. Global Bus. Rev. 13 (2), 201–219.
Slimane, M.B., Huchet-Bourdon, M., Zitouna, H., 2016. The role of sectoral FDI in promoting agricultural production and improving food security. International economics 145, 50–65.
Zallé, O., 2019. Natural resources and economic growth in Africa: the role of institutional quality and human capital. Resour. Pol. 62, 616–624.