Does crude oil output aid economy boom or curse in Nigeria? An inference from "Dutch disease"

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Abstract

Purpose – A reflection on some supposed oil exporting states constantly reminds of the (in) validity of the resource curse hypothesis and environmental consequences of oil exploration. In Africa, especially the case of Nigeria, the argument has remained whether the country's voluminous deposit of crude oil has positively affected the livelihood of the people. The study aims to examine the impact of oil production on the income level in Nigeria.

Design/methodology/approach – In this context, the study first examined validity of Dutch disease in Nigeria, thus providing a foundation to further establish the resource curse hypothesis. As such, the impact of crude oil production (CRUDE), square of crude oil production (CRUDESQ), crude oil reserves (RESERVES) and population (POP) on economic growth over the period of 1980–2018 is examined through the combination of autoregressive distributed lag (ARDL), fully-modified ordinary least square (FMOLS) and canonical cointegration regression (CCR) methods.

Findings – While the study revealed the existence of Dutch disease in Nigeria, the resource curse hypothesis is also valid. However, the study found that the resource curse hypothesis in Nigeria can be over-turned when the CRUDE attains a certain maximum threshold, i.e. when crude oil output is doubled over time. In addition, either of crude RESERVES or oil rent (RENT) is seen as a limiting factor to economic growth while POP poses a positive and desirable impact on the country's economic development.

Originality/value – Thus, the implication of a U-shaped relationship between oil production and income level is that Nigeria's natural resources exploration could be employed to over-turn the potential of resource curse hypothesis by increasing exploration while the sources of leakages and misappropriation of the oil revenues are deliberately mitigated. Other useful socio-economic policies were proposed for the Government.

Keywords Natural resources, Oil exploration, Environmental quality, Economy, Dutch disease, Nigeria

Paper type Research paper

1. Introduction

Among the earth's natural resources, fossil fuel has remained a valuable commodity to many nations, especially when it is available in a larger volume. Specifically, crude oil has long remained a major source of commercial exportation and revenue generating commodity to few nations across the globe. This reason for the significance of crude oil commodity is largely because the product is often refined into several new products that include fuels and lubricants for hardware machine, automotive, water vessels (ships) and aircraft engines (European Commission, 2020). Additionally, the by-products, in addition to fuels and lubricants, are also used in petrochemical processes especially as raw materials for producing plastics and foams. As led by China, the global oil consumption has experienced significant growth. Similarly, consumption of by-product as led by ethane and liquefied petroleum gas (LPG) and followed by diesel and other by-products are also experiencing continued growth (British Petroleum, 2020) It is expected that nations that are endowed with crude oil deposit experiences economy boom and a good standard of living as compared to those without the natural endowment of this lucrative natural resources. Some nations of the world make a better use of it, thus rendering their economy and development to be an envy of many nations. However, a few of the crude oil rich states are drastically lacking behind in term of economic progress and development despite the abundant of these natural resources that are mostly available in extremely large and commercial volumes.

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Taking for instance Nigeria, the largest African country by economy and POP, the country became an independent state from the British colony in October 1, 1960. The country largely relies on oil as its main source of foreign exchange earnings and revenues for the Government (Central Intelligence Agency, 2021). The Nigeria state got her freedom from the British colony under the watch of Queen Elizabeth II of the United Kingdom, which turned to be a great celebration for the Nigerians. Looking at the freedom at hand coupled with the endowed natural resources across the Nigeria, one would expect the country to soon emerge among the world leading economies. This is because, except for the country's domestic challenges, Nigeria has since benefited from the favorable oil production allocation mechanism of the Organization of the Petroleum Exporting Countries (OPEC) (British Petroleum, 2020). Prior to the oil boom era in the country, the nation mainly focused on agriculture that at that time served as a major source of income to the economy. In response to the country's economic development, the country's gross domestic product (GDP) experienced the highest growth of about 25% between 1969 and 1970 as illustrated in Figure A1 of Appendix (World Bank, 2020a).

More so, agriculture serves as a catalyst for the many countries' foreign exchange receipts considering the vital raw materials that are employed as a huge source of trade (Alola and Alola, 2018). The Nigeria state was a major player in agriculture product especially as a major exporter of cocoa, rubber and palm oil in past decades. However, the country's agricultural sectors have since experienced a negative decline after the oil boom. The crude oil provides 90% of revenue for the Nigeria's economy; thus, the oil sector has remained the main catalyst of the country's economy development (Onuoha and Elegbede, 2018). After the discovery of crude oil in Nigeria, there was a drastic fall in the contribution of agriculture to the GDP from 65% to 47%, this downward trend continues in the agricultural sector until the sector hit a point a 26% contribution to GDP (Scherr, 1989; Kasara, 2007). Nevertheless, every other resource has since been almost abandoned or under-utilized such that the oil sector has now replaced or displayed the country's agriculture sector, thus crippling major economic activities in some other sectors (Freund, 1978; Khan and Ahmad, 1994). Currently, Nigeria is the largest economy in Africa by the GDP, courtesy of the country's earnings from crude oil exports, but how oil exploration has improved the country's economy has remained a subject of debate.

However, the spate of poverty increase in this country is alarming. The unimpressive report of the country's human capital development is concrete evidence that the country has continued to suffer huge socio-economic gap (World Bank, 2020b, c). The obvious is likely that the wealth accrued from the crude oil revenues has not been efficiently managed, thus rendering more than 45% of the POP to live below poverty line (World Bank, 2020c; Aljazeera, 2020). The rate of corruption and political crisis in Nigeria's oil industry has been a plague in the region economy (Osoba, 1996; Aluko, 2002; Dike, 2005; Alola *et al.*, 2019a, b). Accordingly, due to corruption in Nigeria, it is reported that 80% of Nigeria's energy revenue is within the reach of less than 2% of the entire POP (Kaieteur News, 2020). Furthermore, the manufacturing and agricultural sectors' contribution to the GDP has seriously faced setbacks arising from the country's over-reliance on the oil sector among other factors (Ogbeidi, 2012; African Development Bank, 2020). However, the fluctuations in the global oil price have adversely affected the country's economic outlook in recent years, thus worsening individuals' quality of life.

In view of the above motivations, the current study attempts to examine the impact of oil production on the income level in Nigeria. Importantly, by reflecting on the "Natural Resources Abundance and economic growth" studies of Sachs and Warner (1995, 1997), the current study further examines of a doubled oil production output on the country's economic development. In addition, the impact of reserves and the POP explosion on the on economic growth in Nigeria is examined. The approach employed in this study is of two folds as follows: (1) as a preliminary investigation, the validity of Dutch disease is evaluated

considering the over-bearing influence of the energy (oil) sector on other main sectors such as the manufacturing and agriculture and (2) the impact of CRUDE on the country's economy is examined from the conceptual framework of growth model. By considering the aforementioned motivation, approach and objective of the study, it is clear that this study offers to establish the perception that the abundance of crude oil deposit (natural resources) in Nigeria poses the capability of adversely affecting the country's economic boom. Another contribution of the current study is that it presents in clear term, at least, to further support the previous assumptions of the reality of Dutch disease in Nigeria. Furthermore, by offering significant policy insight from the implication of the country's CRUDE capacity, RESERVES and POP outlook, the current study demonstrates a significant contribution to extant literature.

Moreover, the outline of the study is presented in a careful pattern. A brief insight into the theoretically and empirically related extant studies is outlined in section 2. In sections 3–5, we presented the data with result of the estimations, discussion of the results and conclusion of the study, respectively.

2. Literature: a synopsis

2.1 Theoretical framework

In the process of justifying the approach employed in the current study, two related theoretical frameworks are considered appropriate and in line with this study. On one hand, we look at the Dutch disease concept; on the other hand, the augmented economic growth model is employed thereafter. The Dutch disease, as initially coined in *The Economist* magazine in 1977, is a paradoxical description of the situation of positive event arising from the discovery of natural resources in the Netherland and the associated harm it brought on the country's economy (The Economist, 2017). Since then, the concept of economic curse (Dutch disease) has been further expanded in the study of Corden (1984). More importantly, the adverse effect of natural resources exploration on the other sectors of the economic such as the manufacturing and agricultural sector *vis-à-vis* Dutch disease has been examined in the world's major exporters of mineral resources (Fardmanesh, 1991; Davis, 1995; Pegg, 2010; Hao *et al.*, 2021; Marañon and Kumral, 2021). However, since the economic growth model of Solow (1956), several studies have augmented the conceptual framework to accommodate the salient drivers of economic growth that include energy *vis-à-vis* natural resources (Apergis and Payne, 2009; Ahmed *et al.*, 2016; Solow, 2016; Murad *et al.*, 2019).

Specifically, by using the Cobb–Douglas production function, Ahmed *et al.* (2016) employed economic growth as a function of exports, capital, natural resources and labor to affirm the validity of the resource curse hypothesis for the case of Iran. Importantly, the study found that an increase by 1% in natural resource production is responsible for a 0.47% decline in the country's GDP. In subsequent studies, the Cobb–Douglas production function is increasingly being modified to accommodate other resource-based factors such as energy development Apergis and Payne (2010a) and others Joshua *et al.* (2020) and Olanipekun and Alola (2020). While considering the case of Nigeria, Joshua *et al.* (2020) employed the ARDLs approach for the time series data over the period 1981–2017. Although the study revealed that POP growth is a short-term inhibitor of economic progress in Nigeria, the long-run inference portrays a different outlook. In the long-term, POP growth, trade openness and globalization are affirmed the important determinant of economic growth in the country.

2.2 Empirical framework

According to the study conducted by Olanipekun *et al.* (2017), crude oil is seen as an important commercial commodity and source of income for many nations and especially the oil exporting

states. The study found that the OPEC succeeded in strengthening and having a controlling power over crude oil price since the 1970s, thus curbing the volatility of the oil prices. Furthermore, Gisser *et al.* (1986) discovered that the global economic event in the post-World War II generated global effect on the crude oil price and has caused a significant disruption in the global economy even after the OPEC involvement in 1973. Hence, many studies have continued to reveal the impacts of the volatile energy prices on the developed economies. Since 1973, the major affinity between crude oil prices and the developed macro economies has been altered. Considering the importance of crude oil, the recent fall in price might make exporting nations have a negative GDP and dramatically reduce their revenue to a poor level. More so, a country like Nigeria that solely depend on the exportation of crude oil for its economy growth is often affected by the events in the Middle East (African Development Bank, 2020).

The investigation conducted by Sakashita *et al.* (2016) proved that economies, particularly the oil importers, might be vulnerable to oil market dynamics. The effect of this, for mineral-rich or crude-oil-producing countries economies such as Nigeria, is that economic downturn may arise from the dwindling oil revenue especially when the other supposedly active sectors are less optimized (the Dutch disease symptom). For instance, Fardmanesh (1991) examined the case of five developing oil-exporting countries (Algeria, Ecuador, Indonesia, Nigeria and Venezuela) in the framework of Dutch disease as it pertains to the countries' manufacturing and agricultural sectors. The study opined that the alteration in the countries' output composition arise the increase in states' revenue. In addition, the world price of manufactured goods relative to the agricultural products, the spending effect and world-price effect are also associated with the shift in the countries' economic output composition.

Moreover, similar to the study of Zhang *et al.* (2018) and Kilian (2009), it was noted that the negative effect of energy market dynamics on the USA economy, in turn, affect the global energy market, especially the emerging economies such as Nigeria. In specific, several studies such as Apergis and Payne (2009) and Ahmed *et al.* (2016) have explored the determinants of economic growth, especially from the perspective of mineral or natural resources such as energy. For instance, Ahmed *et al.* (2016) examined the validity of resource curse hypothesis for the case of Iran within the framework of Cobb–Douglas production function. While establishing the resource curse hypothesis in the study, Ahmed *et al.* (2016) emphatically observed that exploitation of natural resources in the country negatively impede the competitiveness of the other sectors, thus limiting the economic expansion of the country. Moreover, the result further revealed a bidirectional causal nexus between country's natural resources abundance and economic growth.

Meanwhile, Olanipekun and Alola (2020) examined the cost of oil production in the Persian Gulf region. The study used the non-linear autoregressive distributed lag (NARDL) approach to examine the degree of disruption to CRUDE from the geopolitical risk, cost of oil damage and total resources in the Persian Gulf over the period 1975–2018. Considering that there are negative inferences from CRUDE arising from the shock in geopolitical risk and cost of oil damage, the implication of such effect on economic dynamics is expectedly undesirable. Additionally, many studies have offered the different economic aspects of oil, natural gas and shale production (Bebeteidoh *et al.*, 2020; Olayeni *et al.*, 2020; Wang, 2020). Specifically, Wang (2020) used the Permian Basin region of the USA to examine the economic impact of oil and gas development. By examining the local employment and the income effect of the Permian Basin development, the study further examined the spatial spillover effect and the industry-level spillover effect arising from the development of the Basin. Thus, the study found a statistically significant inference of the employment effect and the income effect in the Basin. Additionally, their result revealed a statistically significant evidence of spatial spillover effects and spillover effects to the indirect industries. Similarly, Bebeteidoh *et al.* (2020) examined the effect of the use of local oil refineries in the Niger Delta region of Nigeria. While acknowledging the direct economic benefits (to the refiner) of the local oil refineries which are

largely illegal, the study established the large-scale negative consequence of such activities. Among the economic damage of the local oil refining activities in the Niger Delta region on Nigeria include the destruction of farmland and fishing areas, ecological damage and destruction of lives and properties.

In addition to the contribution of energy-related factors to economic dynamics, democracy, innovation and research and development (R&D) among other non-energy factors are found to contribute to economic changes (Muller, 1995; Adedoyin *et al.*, 2020; Aladejare, 2020; Ho and Iyke, 2020). Specifically, Adedoyin *et al.* (2020) found that R&D plays an important role in the economic prosperity of the European Union states. However, the result established that energy consumption and physical-capital investment outperforms R&D in term of economic drive of the region. On the other hand, Aladejare (2020) compares the role of macro-economic factors and resource price in the economic dynamics of the Economic Community of West African States (ECOWAS) and the Common Market for Eastern and Southern Africa (COMESA) regions. Moreover, the study found that economic growth determination of the ECOWAS region in the long run is more dependent on macro-economic variables than resource-related factors and the reverse is true for the COMESA region. Interestingly, Aladejare (2020) found a de-growth effect of resource price in the long run for the COMESA region while similar effect is found for the ECOWAS region in the short run. According to Ho and Iyke (2020), and using the case of Ghana, there are other factors such as POP growth, financial development and debt servicing that contributes to de-growth of the economy.

3. Material and methods

3.1 Variable description

This empirical study utilized the time series data that are balanced for Nigeria over the experimental period of 1990–2018. The study employed the Cobb–Douglas production function where the dependent variable employed is the GDP. Accordingly, the CRUDE with its CRUDESQ, the RESERVES) and the country's total POP were employed as the explanatory variables. In addition, data for the manufacturing value-added (MANU), export of good and services (EXPORT) and RENT were employed alongside to examine the validity of Dutch disease for Nigeria. In Table 1 (Panel A), additional information and description of the dataset are carefully illustrated. The correlation evidence especially for the dataset for Cobb–Douglas production function is illustrated in panel B of Table 1. Whereas, the statistical properties of the datasets, as shown in Table 2 (Panel A), shows that the variables with the exception of MANU and RESERVES are all normally distributed.

3.2 Model presentation

In investigating the factors responsible for economic expansion *vis-à-vis*, several energy-related or natural resource-based factors have consistently been corroborated in the augmented Cobb–Douglas production function (Apergis and Payne, 2010b; Ozturk, 2010; Ozturk *et al.*, 2010; Ahmed *et al.*, 2016; Kose *et al.*, 2020). However, the case of the oil-exporting country such as Nigeria is expected to post an interesting argument. Importantly, considering the pioneering studies of Sachs and Warner (1995, 1997), the current study offers to examine the economic growth inference from CRUDE capacity and the eventual situation when such capacity is doubled. Thus, the augmented Cobb–Douglas production function (where POP and reserves respectively proxy for labor and capital) becomes as follows:

$$\mathrm{GDP} = f(\mathrm{CRUDE},\ \mathrm{CRUDESQ},\ \mathrm{RESERVES},\ \mathrm{POP}) \tag{1}$$

Hence, the series is transformed to natural logarithm in order to ensure easy interpretation from direct form of elasticities such that the empirical form is presented as follows:

Panel A

Name	Code	Unit of measurement	Source
Gross domestic product	GDP	US$ current	WDI
Manufacturing value-added	MANU	Constant 2010 US$	WDI
Exports of goods and services	EXPORT	Constant 2010 US$	WDI
Crude oil production	CRUDE	Million tonnes	BP
Oil reserves	RESERVES	Thousand million barrels	BP
Oil rent	RENT	Share of the GDP	WDI
Total population	POP	Millions of people	WDI

Correlation (Panel B)

Probability	LGDPC	LOILP	LOILRENT	LPOP
LGDPC	1.000			
LCRUDE	0.682[1]	1.000		
LRESERVES	0.905[1]	0.070	1.000	
LPOP	0.955[1]	0.572[1]	−0.639[1]	1.000

Table 1. Correlation and variable description

Note(s): BP, WDI and US$ represents the British Petroleum, the World Bank Development Indicator and United States Dollars, respectively. The "1" represents 1% statistical signifcant level

$$\mathrm{LnGDP}_t = \gamma_0 + \gamma_1 \mathrm{lnCRUDE}_t + \gamma_2 \mathrm{lnCRUDESQ}_t + \gamma_3 \mathrm{lnRESERVES}_t + \gamma_4 \mathrm{lnPOP}_t + \varepsilon_t \quad (2)$$

where γ_0 is the constant (intercept) and γ_1, γ_2, γ_3 and γ_4 are the coefficients that quantify the respective elasticities for each period $t = 1990, 1985, \ldots, 2018$ and given that ε is the error term that is expected to be normally distributed with zero mean and constant variance.

However, the estimation of the above equation (2) is not performed without first examining the possibility of underlying Dutch disease in Nigeria from these separately presented models:

$$\mathrm{MANU} = f(\mathrm{EXPORT},\ \mathrm{RESERVES},\ \mathrm{POP}) \quad (3)$$

and

$$\mathrm{MANU} = f(\mathrm{CRUDE},\ \mathrm{RESERVES},\ \mathrm{POP}) \quad (4)$$

3.3 Empirical methods

In this part, the empirical procedures are detailed in a structured order. As illustrated in Figure 1, the step-by-step beginning from the preliminary tests (including descriptive statistics and stationarity test) to testing the validity of the "Dutch disease" and resource curse hypothesis are detailed in this section.

3.3.1 Preliminary tests. In order to ascertain the stationarity of the series, we implemented the unit root method of the augmented Dickey–Fuller (ADF) by Dickey and Fuller (1979) (see Table 2). The unit root result from the ADF implied that the all the series are stationary, at least, at first difference. i.e. I (1); however, space constraint has made it impossible to provide the step-by-step procedure for the Dickey and Fuller (1979). In light of the aforementioned evidence, Johansen and Juselius (1990) cointegration test is employed to further test the evidence of long-run relationship as perceived in Figure 2. Hence, the cointegration result indicated in Table A1 of Appendix implies that there is a statistically significant evidence of at least two (2) cointegration equation among the examined series, thus providing the basis for applying further econometric techniques.

Table 2.
Common statistics and unit root test with ADF

Variable	Mean	Median	Maximum	Minimum	Std. Dev	Skewness	Kurtosis	Jarque–Bera
GDP	2.33E+11	1.61E+11	4.69E+11	1.08E+11	1.24E+11	0.805	2.118	5.476
MANU	2.71E+10	2.36E+10	4.42E+10	1.92E+10	8.04E+09	1.011	2.551	6.968[1]
EXPORT	6.12E+10	4.24E+10	1.33E+11	2.67E+10	3.53E+10	0.815	2.062	5.741
CRUDE	96.212	98.429	122.096	60.858	17.142	−0.535	2.410	2.424
RESERVES	27.266	29.000	37.453	15.980	9.146	−0.035	1.197	5.292[3]
POP	1.35E+08	1.32E+08	1.86E+08	95,212,450	27,573,616	0.280	1.884	1.75
RENT	12.254	12.811	26.433	1.514	6.192	0.206	2.406	0.850
Observation	39	39	39	39	39	39	39	39

Unit root tests	Level		First difference	
ADF	with intercept	intercept and trend	with intercept	intercept and trend
*I*GDP	−1.873	−0.539	−1.723	−6.079[1]
*I*MANU	−1.104	−1.803	−4.408[1]	−4.931[1]
*I*EXPORT	−0.002	−3.316[3]	−8.821[1]	−8.854[1]
*I*CRUDE	−1.607	−2.991	−6.523[1]	−6.465[1]
*I*RESERVES	−0.646	−1.135	−4.457[1]	−4.417[1]
*I*POP	−1.031	−3.246	−6.280[1]	−3.015
*I*RENT	−2.060	−2.033	−7.324[1]	−7.372[1]

Note(s): The ADF :Augmented Dickey–Fuller. The [1] and [3] are the respective statistical significance at 1% and 10%. The lgdpc, loilp, loilpsq, loilrent and lpop are the logarithmic value of gross domestic product per capita, the crude oil production, square of the crude oil production, oil rent and the total population, respectively

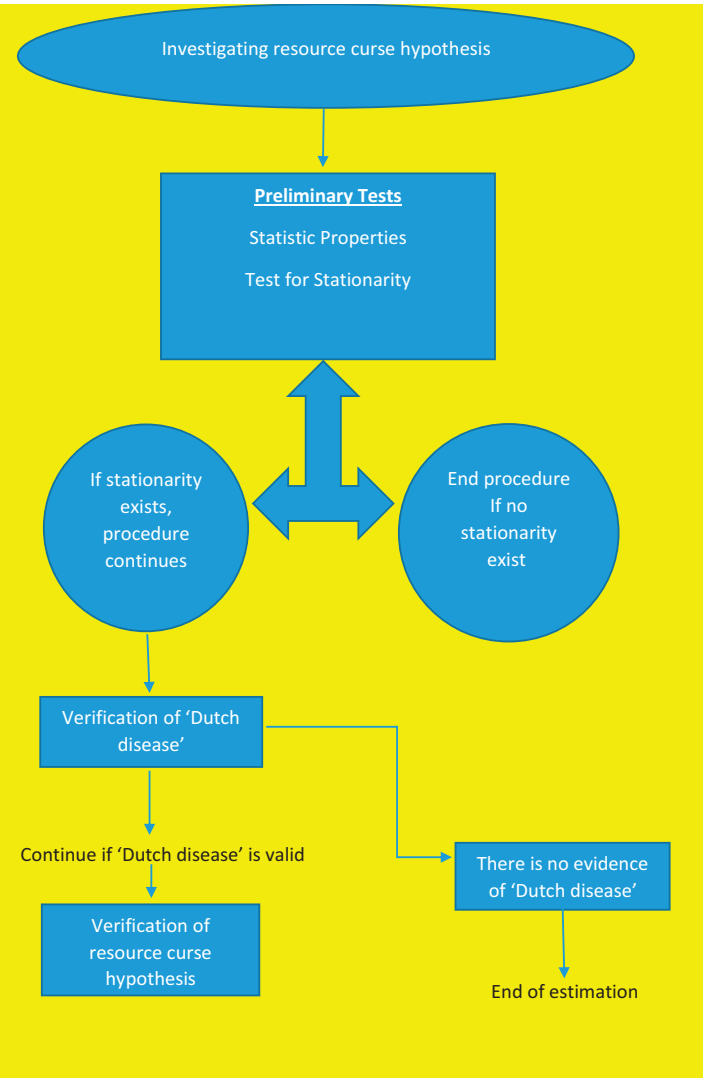

Figure 1.
The estimation procedure

3.3.2 The long-run estimation. In the first and preliminary study, the validly of resource curse hypothesis through the evidence of Dutch disease is examined through equation (3) and subsequently confirmed again by exploring equation (4). While equation (3) employed the export value-added, the CRUDE that serves as the main sources of export for Nigeria is employed in the second equation. Indicatively, the respective results in panel A and panel B (see Table A2 of Appendix) affirms the validity of Dutch disease in the two approaches in the short and long run. Although the procedure is not covered here for lack of space, the aARDL of Pesaran *et al.* (2001) employed in this case presents a desirable diagnostic result as shown in Table A2.

In addition, we employ the FMOLS and Canonical Cointegrating Regression (CCR) to advance the long-run nexus conceived in equation (2). In the case of the FMOLS, the estimated

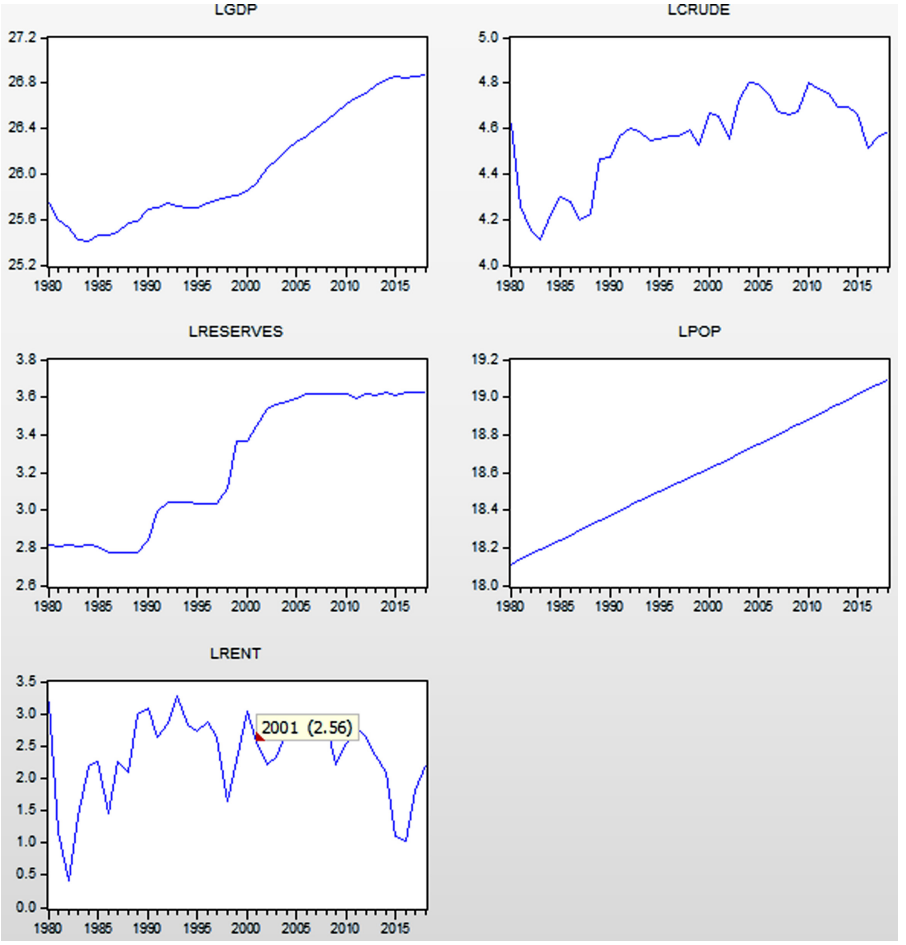

Figure 2.
The visual trend of the variables

coefficient for equation (2) is derived from the equation as follows:

$$\widehat{\beta}_{FMOLS} = \left\{ \sum\sum_{t=1}^{T} \left(xt - \overline{x}\right)\left(xt - \overline{x}\right) \right\}^{-1} * \left\{ \sum\sum_{t=1}^{T} \left(xt - \overline{x}\right)\left(\overline{GDP} - T\Delta\varepsilon\mu\right) \right\} \quad (5)$$

Furthermore, equation (5) is modified to illustrate the coefficient estimate for CCR. For brevity, the step-wise approach of the approaches are provided in the studies of Phillips and Hansen (1990), Saikkonen (1992) and Stock and Watson (1993).

Importantly, a robustness test is provided for the main model (equation 2) by incorporating RENT *in lieu* of RESERVES. Thus, the below model is employed as a robustness check such that the result for the actual and robustness estimations are presented in Tables 3 and 4, respectively.

$$\text{GDP} = f(\text{CRUDE},\ \text{CRUDESQ},\ \text{RENT},\ \text{POP}) \quad (6)$$

Panel A	LGDP = *f* (LCRUDE, LCRUDESQ, LRESERVES, LPOP) LCRUDE	LCRUDESQ	LRESERVES	LPOP
FMOLS	−15.075[2]	1.679[2]	−0.148	1.909[1]
CCR	−15.209[3]	1.700[3]	−0.184	1.936[1]
Robustness Result Panel B	LGDP = *f* (LCRUDE, LCRUDESQ, LRENT, LPOP) LCRUDE	LCRUDESQ	LRENT	LPOP
FMOLS	−14.323[3]	1.603[3]	−0.057	1.713[1]
CCR	−15.141[3]	1.673[3]	−0.009	1.804[1]

Table 3. Cointegration estimates

Note(s): The [1], [2] and [3] are the 1%, 5% and 10% significant level, respectively. The *lgdp, lcrude, lreserves loilrent* and *lpop* are the logarithmic value of gross domestic product, the crude oil production, crude oil reserves, oil rent and the total population, respectively

		F-statistic	Prob
LCRUDE does not Granger cause LGDP	38	3.093[2]	0.087
LGDPC does not Granger cause LCRUDE		0.525	0.473
LRESERVES does not Granger cause LGDP	38	15.465[1]	0.000
LGDP does not Granger cause LRESERVES		0.888	0.353
LRENT does not Granger cause LGDPC	38	5.859[2]	0.021
LGDPC does not Granger cause LRENT		0.216	0.645
LPOP does not Granger cause LGDP	38	32.839[1]	2.E−06
LGDP does not Granger cause LPOP		50.50489	3.E−08

Table 4. Granger causality tests

Note(s): The [1] and [2] are the 1% and 5% significant level, respectively. The lgdp, lcrude, lreserves loilrent and lpop are the logarithmic value of gross domestic product, the crude oil production, crude oil reserves, oil rent and the total population, respectively

In addition, the Granger causality approach of Granger (1969) is also employed, which further offers a supporting evidence of the nexus between economic growth and the concern variables.

4. Discussion

As illustrated in Table 3, the changes in the economic growth in Nigeria from the perspective of CRUDE in the country supports the resource curse hypothesis since there is a statistically significant evidence of negative relationship between the country's natural resources (crude oil) and output. Specifically, a 1% increase in the country's oil production is responsible for a significant downturn in the country's economy by 15.08% (FMOLS approach) and 15.21% (CCR approach). Moreover, there is background evidence of "Dutch disease" as illustrated in Table A2 of Appendix that is occasioned by a decline in the value-added from the country's manufacturing industry (in this case the agricultural sector) as the production of crude oil or exploration of natural resources is intensified. In reality, this situation is tenable for the case of Nigeria where grievous and long years of corruption and mismanagement of the oil revenue potentially justifies this observation (Nurudeen and Waldemar Staniewski, 2019; United Nations Office on Drugs and Crime, 2019). The implication is that oil production impedes the country's economic boom, thus affirming the evidence of a negative relationship between economic growth and natural resource abundance (resource curse) for the case of Iran by Ahmed *et al.* (2016). However, the study found that a continuous increase in oil

production (i.e. doubled CRUDE) has a potential to overturn the resource curse, thus yielding a significant economic boom. In specific, a 1% increase in the CRUDESQ is responsible for a significant boom in the country's economic output by 1.68% FMOLS and 1.70% CCR. The resource "curse" or "blessing" hypothesis has remained an arguable perspective in the literature (Van der Ploeg, 2011) likewise the validation of the "Dutch diseases" in many economies (Hao *et al.*, 2021; Marañon and Kumral, 2021). Considering the indication of a positive relationship between resources abundance and economic expansion, this results resonant with a similar outcome from the extant studies that supported the hypothesis of economic boom arising from increased CRUDE especially for the oil-dependent nations (Barbier, 2004; Kasara, 2007). Contrarily, the study of Ahmed *et al.* (2016) validates the resource curse hypothesis for the case of Iran. Specifically, the study found that a 1% increase in the natural resource production triggers a 0.47% decrease in the country's GDP.

Moreover, the result also found that RESERVES in Nigeria is detrimental to the country's economic output. Specifically, a decline of 0.15% FMOLS and 0.18% CCR in the economic output is caused by a 1% increase in the RENT. The result of a negative nexus between RENT and economic growth further supports the evidence of resource curse hypothesis as highlighted above. Because the country's economy is largely oil dependent, increasing the RESERVES stock will potentially limit the country's opportunity to accumulate wealth, at least, in the interim (United States Energy Information Administration, 2020). In addition, as depicted in Table 3, there is a significant and positive impact of the country's POP on economic growth in the two estimation approaches (FMOLS and CCR). The explanation for this result is that POP is a necessary and contributing factor for labor supply. Thus, an increase in labor as factor of production expectedly triggers economic output. On the contrary, Ho and Iyke (2020) employed POP growth as a proxy for labor and found that labor, financial development and debt-servicing exert a negative impact on the economic progress of Ghana.

4.1 Robustness and diagnostic evidence

Additional evidence from the robustness test in lower part of Table 3 further amplifies the aforementioned results. By employing RENT *in lieu* RESERVES, the validity of the resource curse hypothesis robustness is expectedly ascertained. Similarly, the impacts of RENT and POP on economic growth are significant, and are, respectively, positive and negative.

The standard Granger causality by Granger (1969) offers additional robustness to the study (see Table 4). Categorically, the result shows a significant unidirectional Granger causality from CRUDE, RENT and RESERVES to the real GDP as indicated in the cointegration estimates. However, there is significant bidirectional Granger causality between POP and the country's economic output.

5. Conclusion and policy

There has been a consistent argument about the validity of the resource curse hypothesis especially for the cases of the crude oil exporting or the natural resource-endowed states. By offering a significant contribution to the literature, the current study examined the role of CRUDE, crude RESERVES, RENT and POP in economic development in Nigeria. In order to achieve the desired objective of the study, we approach the study from two dimensions. First, we explore the validity of the Dutch disease hypothesis by exploring the function of the MANU from the perspective of both the export value-added and CRUDE in the country. Second, we examine the resource curse hypothesis by examining the effect of CRUDE alongside incorporates the CRUDESQ in the Cobb–Douglas production function such that relevant inferences are provided, given the threshold of CRUDE. In addition, the impact of

POP on economic growth was examined over the same experimental period of 1980–2018. The econometric techniques implemented in the study is a combination of ARDL, FMOLS and CCR approaches.

Importantly, the result validates the statistical evidence of Dutch disease for Nigeria. In addition, the study revealed that CRUDE triggers economic downturn until a threshold is attained such that continuous exploration of crude oil begins to make significant contribution to economic expansion. All things being equal, this result affirm that the existence of resource curse hypothesis in Nigeria can be overturned when the crude oil output is doubled or CRUDE attains a certain level (turning point). Furthermore, the country's RENT and crude RESERVES also impede economic growth while POP consistently plays a desirable role in the country's economic development.

5.1 Policy implications

Most importantly, the current study revealed important policy guide for Nigeria. First, the Government should intensify the diversification policy of the country's economy. This is important to resuscitate the dwindling earnings from the country's manufacturing industry (especially from agricultural products) as caused by the advent of CRUDE, thus averting the "Dutch disease" scenario in the country. As such, the endangering effect of having an oil-reliant economy can be overtuned, thus improving the country's long-run economic overview. In addition, the Government, the stakeholders in the oil sectors and the community leaders especially in the oil producing communities should further engage in inclusive dialog in order to foster peace and end the history of militancy, oil bunkering and other menace associated with the energy country's sector. Beyond the economic sabotage of oil bunkering, environmental damages and other undesirable effects will be significantly reduced if an end is brought to these illegal activities. Possibly, the Government could begin to consider the liberalization and privatization of the country's oil industry in order to instill more transparency through a more public–private sector engagement. In the aspect of POP, the country's POP could be better harnessed toward improving the economy. All things being equal, the resource curse hypothesis in the country could be difficult to overturn with the above measures except some other socio-economic factors such as corruption, institutional or systemic challenges that arise from unnecessary bureaucratic principles are deliberately tackled.

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Appendix

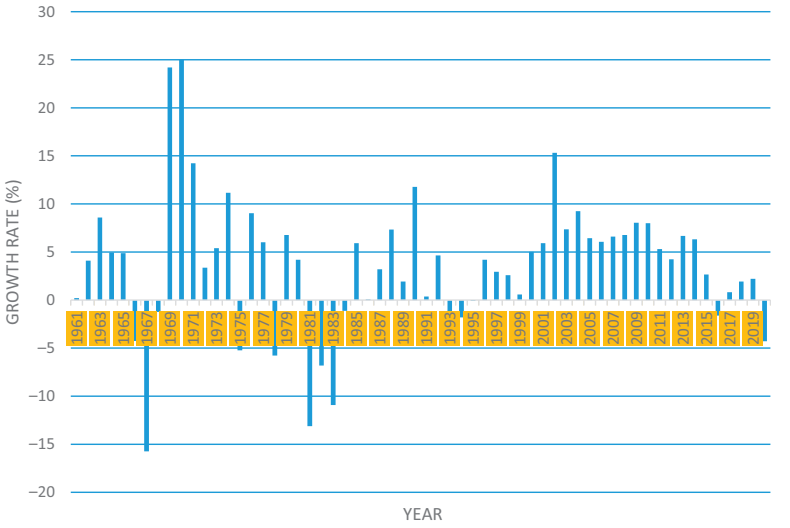

Figure A1.
Illustration of the Nigeria's real gross domestic product growth rate

Unrestricted cointegration rank test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.905	125.609	47.856	0.000
At most 1 *	0.529	40.862	29.797	0.002
At most 2	0.319	13.875	15.495	0.086
At most 3	0.001	0.023	3.841	0.880
Unrestricted cointegration rank test (maximum eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.905	84.647	27.584	0.000
At most 1 *	0.529	27.086	21.132	0.006
At most 2 *	0.319	13.853	14.265	0.058
At most 3	0.001	0.023	3.841	0.880

Table A1.
Cointegration evidence

Note(s): The * indicate the significant evidence of the number of cointegrating equation in the model

LManu = *f* (LEXPERT/LCRUDE, LRESERVES, LPOP)

Panel A	LEXPORT	LRESERVES	LPOP	Adj. P
SR	−0.203[2]	0.494[3]	147.363[1]	−0.214[1]
LR	−0.947[3]	−1.366[2]	3.604[2]	

Diagnostic Result

SC: *F*-statistics (*p*-value) = 0.928 (0.343) and H: *F*-statistics (*p*-value) = 0.801 (0.557)

Skewness = −0.191 Kurtosis = 2.695 Jarque–Bera (*p*-value) = 0.379 (0.827)

Panel B	LCRUDE	LRESERVES	LPOP	Adj. P
SR	−0.387[3]	0.102	95.852[1]	−0.281[1]
LR	−0.964	−1.173[2]	2.450[1]	

Diagnostic Result

SC: *F*-statistics (*p*-value) = 0.026 (0.873) and H: *F*-statistics (*p*-value) = 0.913 (0.529)

Skewness = −0.010 Kurtosis = 2.473 Jarque–Bera (*p*-value) = 0.417 (0.812)

Note(s): Adj.P, SR, LR, SC and H are, respectively, adjustment parameter, short run, long run, serial correlation and heteroskedasticity. [1], [2] and [3] are, respectively, 1%, 5% and 10% statistically significant level

Table A2. Statistical evidence of Dutch disease

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