POLAC ECONOMICT REVIEW (PER)
DEPARTMENT OF ECONOMICS AND MANAGEMENT SCIENCE
NIGERIA POLICE ACADEMY, KANO

RE-EXAMINING THE VALIDITY OF RESOURCE CURSE HYPOTHESIS IN NIGERIA: THRESHOLD REGRESSION APPROACH

Ahmed Bala Department of Economics, Umaru Musa Yar'adua University Katsina, Nigeria

Naim Aliyu Department of Economics, Federal University Dutsinma Katsina, Nigeria

Haruna Abubakar Modibbo Department of Economics, Umaru Musa Yar'adua University Katsina, Nigeria

Abstract

This study uses a threshold regression analysis to re-examine the relationship between oil revenue and economic growth as a further test for the validity of resource curse hypothesis in Nigeria, spanning the period of 1981-2020. The data are sourced from World development indicators and CBN statistical bulletin (2020). The finding reveals the existence of inverted U-shape relationship between oil revenue and economic growth with a maximum threshold of 9.56%, after which oil revenue has a negative effect on economic growth. Below the threshold level, oil revenue has a positive effect on economic growth. This result affirms that resource curse hypothesis is valid for Nigeria under the period of investigation. Based on this finding, the study recommends that, economic transformation and diversification strategies should be intensified so as to reduce over reliance on export of volatile crude oil.

Keywords: Economic growth, Oil Revenue, Resource Curse, Threshold Regression, Nigeria.

JEL Codes: C12,C22,O47, Q32.

1. Introduction

There has been a conventional belief that countries endowed with natural resources such as oil, gas and mineral scan base the growth of their economy on these resources, and use them as a backbone for sustainable economic growth. However, economists have noticed that resource-rich countries especially, developing countries in Africa, Latin America and Middle East have been growing at slower rate in terms of economic progress than resource-poor countries (Badeeb, Lean & Clark, 2017). These countries are said to suffer from a "resource curse" (Auty, 1994).This curse refers to an inverse relationship between economic growth and natural resource dependence. Specifically, oil curse has been attributed to countries whose economies are heavily dependent on oil production.

Nigeria is one of the countries endowed with abundance of crude oil and the largest producer of oil in Sub-Saharan Africa. Since the first discovery of oil in 1956, it has been continue to be the mainstay of the Nigerian economy. Dada and Abanikanda (2019) observed that oil export revenue account for about 86% of the total export revenue. Similarly, according to available statistic in Central Bank of Nigeria (CBN, 2020), the growth rate of oil export revenues during the 2010s oil boom period, are 12.86% (2010), 16.56% (2011) and 13.99% (2012). Despite these huge increases in oil export revenues, the growth rate of the economy proxied by gross domestic product (GDP) witnessed decline during the same period. Specifically, in 2010 the GDP growth rate is 8.01%, while, the growth rate are 5.31%, and 4.23% in 2011 and 2012 respectively. These statistical evidences opened to questioning the conventional belief that, increase in oil export revenue has positive effect of economic growth in Nigeria. Thus, the objective of this study is to empirically re-examine the relationship between oil revenue and economic growth in Nigeria. After this introduction, the rest of this paper is organized as follows: Literature

review, methodology, results and discussion, conclusion and recommendations.

2. Literature Review

The concept of the role natural resources plays in economic growth processattracted the attention of economists over the years. Two main opposing views have emerged explaining the role natural resources play in an economy. One school of thought argues that natural resources are blessing and can help in boosting economic development and foster improvements in the wellbeing of citizens (Rostow, 1960). This is called "natural resource bless hypothesis". On the other hand, some economists have view that natural resources can be harmful to the economy by creating inefficiency in the other sectors of the economy. This is what Auty(1994) coin as a "resource curse hypothesis".

Hence, there are large body of theoretical and empirical studies on the relationship between natural resources and economic growth. Theoretically, the contribution of Adam Smith on how natural resources play an important role in the process of economic growth through absolute trade advantage has been credited as pioneering study in the field of international trade. David Ricardo also suggest using comparative cost advantage that exportation of natural resources can assist in reorienting countries with abundance resources to boost other sectors of the economy. The conclusion of these pioneering studies is that exportation of natural resources can positively increase economic growth via absolute or comparative cost advantages (Zhonogo, 2018).

Building on these earlier theoretical contributions of classical scholars, one of the renowned contributions came from Rostow (1961) who contended that natural resource endowments could help poor developing countries in their transition from under-developed to industrial take off (Badeeb et al., 2017). This implies that natural resource has a positive influence in the process of economic growth of a given country. However, the gradual decline of Dutch manufacturing sector in 1980s after the discovery of natural gas opened to questioning the optimistic belief of the positive effect of natural resources in the process of economic growth. Inspiring by this incidence, many researchers began to empirically investigate the relationship between natural resources and economic growth using panel data of countries and country specific studies.

Turning to empirical literature, a growing number of studies have examined the impact of natural resources, particularly oil resources on economic growth. However, majority of the reported findings of these studies showed conflicting results across different types of methodologies and countries used. It is in fact obvious from empirical review conducted that while most of the studies reported positive relationship between oil resources and economic growth with the existence of resource curse for a panel of selected countries and country-specific studies, few other studies found the contrary results. For instance, using a panel data of 14 Sub-Saharan Africa (SSA) resource-abundant countries, Abdulahi, Shu and Khan (2019) employed institutional quality (IQ) as threshold variable to investigate the relationship between natural resource rents and economic growth. The results revealed that natural resource rents have a positive effect on economic growth when a country's IQ is above the threshold level, whereas the effect is negative when the IQ is below the threshold level.

Similarly, Matallah (2020) employed generalized method of moment (GMM), fixed effects, random effects and pooled OLS estimators to examine the effect of oil rents on economic growth and symptoms of resource curse in 11 oil exporters MENA countries over a period of 1996-2017. The main findings indicate that economic growth of MENA oil exporters is positively and significantly influence by oil rents. However, oil exporters MENA countries have been diagnosed with resource curse and over dependence on oil rents which retard diversification strategies.

Khayati (2019) used Johansen's cointegration approach to examine the impact of oil and non-oil export on economic growth in Bahrain from 1977 to 2015. The results revealed that oil and non-oil exports have positive

and significant impact on economic growth of Bahrain. However, the impact of oil export on economic growth is higher than non-oil export.

Solarin (2020) adopted a maximum likelihood approach to investigate the effect of shale oil production on economic growth in the United States from 2002Q1 to 2019Q4. The findings revealed that shale oil production has a positive effect on economic growth. The findings also showed the positive effect of shale oil production on employment level, however, the effect of shale oil production on employment level is less than the effect of shale oil production on economic growth. The implication of the result is that, shale oil production in the United States is yet to indicate the tendency of resource curse.

In the specific case of Nigeria, Esu (2017) employed ARDL bounds test to examine the effect of oil revenue on economic growth in Nigeria over a period of 1980 to 2015. The result showed that oil revenue has a positive and significant effect on economic growth in Nigeria. However, the resource curse hypothesis was found to be present and had been transmitted by institutional factors such as corruption, weak institutional quality, government ineffectiveness and political instability. Omitogun, Longe and Muhammad (2018) also employed autoregressive regressive distributed lag (ARDL) approach to examine the impact of oil price and revenue variation on economic growth in Nigeria from 1981 to 2016.The short-run result revealed that both oil price and oil revenue have positiveimpact on economic growth. But in the long-run, only oil price haspositive impact on economic growth, while oil revenue has negative effect oneconomic growth in Nigeria.

Olayungbo (2019) used Bayesian time-varying parameter (TVP) model to investigate the impact of oil export revenue on economic growth and further verify the validity of resource curse hypothesis in Nigeria from 1970 to 2015. The findings revealed that oil revenue has positive and significant effects on economic growth throughout the period of study. However, Nigeria's economy is found to be a resource dependent economy. Similarly, Dada and Abanikanda (2019) also investigate the relationship between oil revenue and economic growth in Nigeria from 1980 to 2017 by focusing on threshold level of oil revenue. The results revealed an inverted U-shape relationship between oil revenue and economic growth, with a maximum threshold of 6.17%, after which oil revenue has a negative impact on economic growth. Below the threshold level, oil revenue has positive effect on economic growth, which affirms the existence of resource curse hypothesis in Nigeria.

One noticeable gap in the above studies is that, although many researchers empirically examined the effects of oil revenue on economic growth in Nigeria, but few of them (for example, Esu, 2017; Olayungbo, 2019;Dada & Abanikanda, 2019) tested the threshold before arriving at the conclusion of either positive or negative effects of oil revenue on economic growth in Nigeria. Hence, in order to fill this literature gap, this study used a threshold regression analysis to re-examine the relationship between oil revenue and economic growth in Nigeria.

3. Methodology

3.1Sources of Data

The data on GDP growth rate, labour force which represented by population growth rate (POP) and gross capital formation (GCF) are sourced from World Development Indicators (WDI) database of the World Bank (2021). On other hand, the data on oil revenue (OIL) is obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin (2020). The data cover the period of 1982 to 2019.

3.2 Model Specification and Estimation Techniques

Following Dada and Abanikanda (2019), Cobb-Douglas production function augmented to incorporate oil revenue, and the oil revenue serve as the threshold variable in this study. The functional form of the model is specified in model (1):

$$GDP_t = f(OIL_t,\ POP_t,\ GCF_t) \quad (1)$$

Expressing model (1) in terms of growth rate yields the baseline econometric model of the study as presented in model (2).

$$GDP_t = \alpha_0 + \alpha_1 OIL_t + \alpha_2 POP_t + \alpha_3 GCF_t + \varepsilon_t \quad (2)$$

Model (2) is a conventional linear growth model. This model is decomposed into two regimes threshold autoregressive (TAR) model (3):

$$GDP_t = \begin{cases} \alpha_0 + \alpha_1 OIL_t + \alpha_2 POP_t + \alpha_3 GCF_t + \varepsilon_t \ \ if\ \gamma_t \leq \theta \\ \beta_0 + \beta_1 OIL_t + \beta_2 POP_t + \beta_3 GCF_t + \varepsilon_t \ \ if\ \gamma_t > \theta \end{cases} \quad (3)$$

In model (3),GDP_t represent growth rate of the economy; OIL_t, POP_t, GCF_t are growth rate of oil revenue, population and gross capital formation respectively; $\alpha_0$andβ_0 are the intercepts of the first and second regime respectively; $\alpha_1, \alpha_2,$ and α_3 represent the coefficients of first regime variables; $\beta_1, \beta_2,$ and $\beta_3$are the coefficients of the second regime variables;ε_t shows the error-term; γ_t represent the threshold variable (oil revenue); lastly, θ is threshold value. Model (3) is also specified in compact form as follows:

$$GDP_t = \begin{matrix} [\alpha_0 + \alpha_1 OIL_t + \alpha_2 POP_t + \alpha_3 GCF_t] \ \ OIL\,(\gamma_t \leq \theta) \\ +[\beta_t + \beta_1 OIL_t + \beta_2 POP_t + \beta_3 GCF_t] + \varepsilon_t \ \ OIL\,(\gamma_t > \theta) \end{matrix} \quad (4)$$

In this study, oil revenue is used as the threshold variable. While, the value of the threshold (θ) wasfound by estimating the model (4) through finding the minimum error sum of squared in a re-order threshold variable. Similarly, this study used the statistic found from the threshold variable. In addition, the threshold value is determined using the Bai-Perron tests of L + 1 versus L sequential at 5% level of significance. The Bai-Perron test allows one threshold value of oil revenue to be selected out of five maximum numbers of thresholds.

Prior to conducting the threshold regression analysis, it is essential to explore the nature and characteristics of the data, therefore, the analyses start with some preliminary tests on the properties of the data which include descriptive statistics and unit root test to check each time series for stationarity. If a time series is non-stationary, the regression analysis done in a traditional way will produce spurious results. Therefore, the unit root tests are carried out first. Consequently, two units root tests are employed in this study, namely, Augmented Dickey-Fuller (ADF), and the Phillips-Perron (PP) tests.The ADF unit root test model is specified in model (5):

$$\Delta Y_t = \beta_1 + \beta_{2i} + \delta Y_{t-1} + \sum_{i=1}^{k} \Delta Y_{t-i} + \varepsilon_t \quad (5)$$

Where ΔY_t is the first difference of the series Y; k is the lag order; t is the time period; β_1 and δ are parameters to be estimated; while ε_t is a white noise error term. Y is a stationary series if $0 < \delta < 1$. The null hypothesis to be tested is H_0: $\delta = 1$ indicating the presence of a unit root against the alternative H_0: $\delta < 1$.

4. Results and Discussion

4.1 Descriptive Statistics Results

The summary of various descriptive statistics presented in Table 1 revealed that, all the variables have the mean values ranged from 0.1559 to 12.0600. Mean value represents the average value that a variable assumes over time. OIL seems to have the highest mean value (12.0600), while, GCF (0.1559) has the lowest mean value. However, GCF has the highest standard deviation (13.4105), while POP has the lowest standard deviation (0.0644).

Moreover, the data is consistent, because the mean and median are within the range of the maximum and minimum values. Other important characteristics of the data are the skewness which measures the degree of symmetry of the series and Kurtosis which measure the peakedness or flatness of the distribution of the series around the mean value. Normal skewness has zero (0) value, which means the distribution is symmetry around the mean. Positive skewness indicates more high values (long right tail) above the sample mean. While, negative skewness means lower values (long left tail) below the sample mean. From table 1, OIL, POP and GCFhave positive skewness values, which mean the absolute valuesof the variables, are highly skewed to the right (long right tail). The skewness value of GDP was found to be negative, which implies that the distributions have long-left tail (skewed to the left).

Table 1: Descriptive Statistics Results

Variables/Statistics	GDP	OIL	POP	GCF
Mean	3.5783	12.0600	2.5784	0.1559
Median	4.2130	11.7828	2.5825	2.0645
Maximum	15.3292	26.4285	2.6809	40.7439
Minimum	-10.9241	1.4472	2.4888	-30.1846
Std. Dev.	4.8322	5.8267	0.0644	13.4105
Skewness	-0.5127	0.2085	0.0671	0.0967
Kurtosis	4.3686	2.5541	1.6600	4.2001
Jarque-Bera	4.6306	0.5902	2.8714	2.3396
Probability	0.0987	0.7445	0.2379	0.3104
Observations	38	38	38	38

Source: Author's computation (2021)

The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked (leptokurtic) relative to the normal distribution; if the kurtosis is less than 3, the distribution is flat (platykurtic) relative to the normal distribution. Result in table 1, indicated that thekurtosis values of GDP and GCF exceed 3, which means that the distributionsis peak (leptokurtic). On the other hand, the kurtosis values of OIL and POP are less than 3, which implies that the distributions are flat(platykurtic).

4.2 Unit Root Tests Result

The unit root tests results reported in Table 2 showed that all the variables are integrated of order zero, I(0), that is stationary at level. This requires no differencing and testing for cointegration is also not necessary. Because, any shock to the system in the short-run run quickly adjusts to the long-run equilibrium.

Table 2: ADF and PP Unit Root Tests Results

	Level				
Variables	ADF		PP		
	t-Statistic	Prob.	Adj. t-stat	Prob.	Status
GDP	-3.7994	0.0278	-3.6508	0.0389	I(0)
OIL	-3.4221	0.0642	-3.3885	0.0178	I(0)
POP	-4.8131	0.0006	-3.7771	0.0068	I(0)
GCF	-5.1118	0.0002	-5.7599	0.0000	I(0)

Note: Both intercept and trends are included in the estimations and Schwarz Information Criterion (SIC) is used to select optimal lag length in the ADF test.
Source: Author's computation (2021)

4.3 Threshold Regression Result

The threshold regression result reported in Table 3 reveals that, the threshold value of oil revenue is 9.56%. When the growth rate of oil revenue is less than this threshold level, oil revenue has a positive and significant effect on economic growth in Nigeria. Specifically, a 1% increase in oil revenue, increase economic growth by 0.97%.

Table 3: Threshold Regression Result

Threshold Variable: OIL				
Variables	First regime: OIL < 9.5568			
	Coefficient	Std. Error	t-Statistic	Prob.
OIL	0.9693	0.4078	2.3769	0.0240
POP	-4.8888	19.3655	-0.2525	0.8024
GCF	0.2945	0.0906	3.2500	0.0028
C	8.9925	50.9954	0.1763	0.8612
Second Regime: 9.5568≤ OIL				
OIL	-0.0394	0.1805	-0.2183	0.8287
POP	22.0849	10.6307	2.0775	0.0464
GCF	0.0083	0.0538	0.1533	0.8792
C	-51.6323	28.0213	-1.8426	0.0753
R^2	0.5852			
Adjusted R^2	0.4884			
F-statistic	6.0462			0.0002
D-W. stat	1.7569			

Source: Author's computation (2021)

This implies that when the growth rate of oil revenue is minimal, policy makers in Nigeria are frugal and able to make efficient planning with the available scarce resources, thereby leading to economic growth. However, when the growth rate of oil revenue is greater than this threshold level (9.56%), oil revenue has a negative effect on economic growth in Nigeria. Specifically, a 1% increase in oil revenue leads to 0.04% decrease in economic growth.

This further implies that when the growth rate of oil revenue is maximal, government tends to spend the oil revenue in an inefficient manner, such as increasing consumption expenditure instead of savings and investing in productive sectors. In addition, increase in oil revenue may leads to neglecting other sectors of the economy which by implication has a negative effect on economic growth in Nigeria. Thus, it is evident from the empirical results that Resource curse hypothesis is valid for Nigeria. The finding of this study supports those of Esu, (2017) Olayungbo, 2019, Dada and Abanikanda (2019) on the validity of Resource curse hypothesis is valid for Nigeria.

4.3: Residual Diagnostic and Model Stability Tests Results

The results of diagnostic tests reported in Table 4 shows that the model passed all the tests: including normality, serial correlation, heteroscedasticity and functional form.

Table 4:Residual Diagnostic Tests Results

Test Statistic	F-Statistics	Prob.
Normality: Jarque-Bera	0.3360	0.8454
Serial Correlation: Breush-Godfrey	1.6934	0.2022
Heteroskedasticity: Breush-Pagan-Godfrey	1.2633	0.3014
Functional Form: Ramsey Reset	0.0823	0.7763

Source: Author's computation (2021)

The results of model stability tests in Figure 1 show that the model is stable. Because, the CUSUM and CUSUMSQ plot lies within the 5% statistically significance level boundary

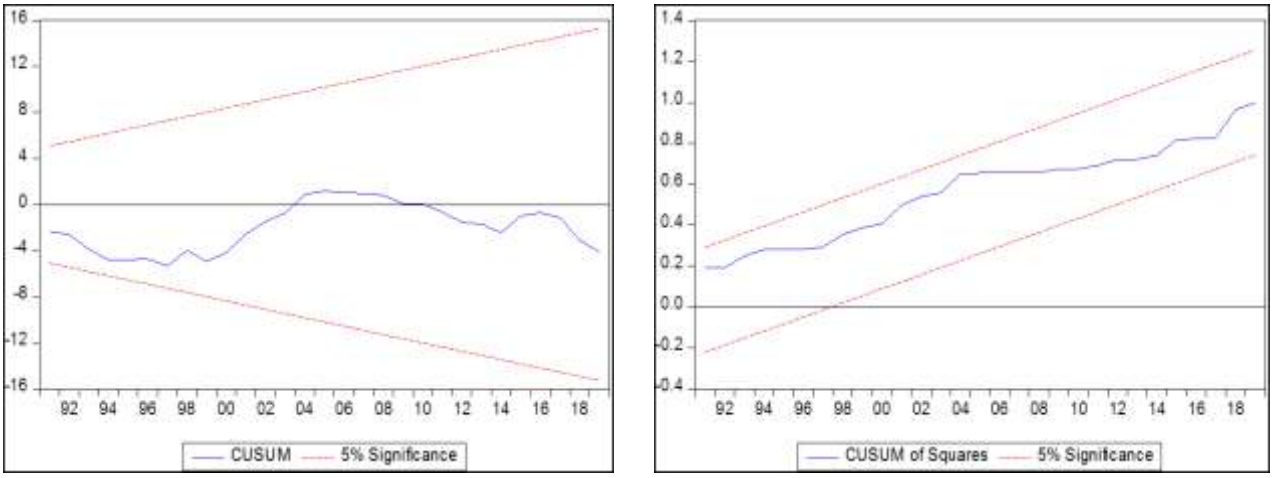

Figure 1: CUSUM and CUSUMSQ

5. Conclusion and Recommendations

This study uses a threshold regression analysis to re-examine the relationship between oil revenue and economic growth as a further test for the validity of resource curse hypothesis in Nigeria from 1982 to 2019. The finding reveals the existence of inverted U-shape relationship between oil revenue and economic growth with a maximum threshold of 9.56%, after which oil revenue has a negative effect on economic growth. Below the threshold level, oil revenue has a positive effect on economic growth in Nigeria. Based on this finding, the study concludes that resource curse hypothesis is valid for Nigeria under the period of investigation.

Hence, the study recommends that, economic transformation and diversification strategies should be intensified so as to reduce over reliance on revenue from volatile crude oil. Government should also ensure that the revenues from oil were invested in productive sectors and strengthen anti-corruption agencies, so as to reduce corrupt practices and embezzlement as well as blocking revenue leakages.

References

Abdulahi, M. E., Shu, Y., & Khan, M. A. (2019). Resource rents, economic growth, and the role of institutional quality: A panel threshold analysis. *Resources Policy*, *61*, 293-303.

Auty, R. M. (1994). Industrial policy reform in six large newly industrializing countries: The resource curse thesis. *World development*, *22*(1), 11-26.

Badeeb, R. A., Lean, H. H., & Clark, J. (2017). The evolution of the natural resource curse thesis: A critical literature survey. *Resources Policy*, *51*, 123-134.

Dada, J. T., &Abanikanda, E. O. (2019). How important is oil revenue in Nigerian growth process? Evidence from a threshold regression. *International Journal of Sustainable Economy*, *11*(4), 364-377.

Esu, G. E. (2017).Assessing the resource curse question: A Case of crude oil production in Nigeria.*Journal of Economic Research*, *22*(2), 153-213.

Khayati, A. (2019). The effects of oil and non-oil exports on economic growth in Bahrain. *International Journal of Energy Economics and Policy*, *9*(3), 160.

Matallah, S. (2020). Economic diversification in MENA oil exporters: Understanding the role of governance. *Resources Policy*, *66*, 101602.

Olayungbo, D. O. (2019). Effects of oil export revenue on economic growth in Nigeria: A time varying analysis of resource curse. *Resources Policy*, *64*, 101469.

Omitogun, O., Longe, A. E., & Muhammad, S. (2018). The impact of oil price and revenue variations on economic growth in Nigeria. *OPEC Energy Review*, *42*(4), 387-402.

Rostow, W. W., & Rostow, W. W. (1961).*The stages of economic growth: A non-communist manifesto*. Cambridge university press.

Solarin, S. A. (2020). The effects of shale oil production, capital and labour on economic growth in the United States: A maximum likelihood analysis of the resource curse hypothesis. *Resources Policy*, *68*(C).

World Bank.(2021). World Development Indicators. Retrieved from https://databank.worldbank.org/source/world-development-indicators

Zahonogo, P. (2016). Trade and economic growth in developing countries: Evidence from sub-Saharan Africa. *Journal of African Trade*, *3*(1-2), 41-56.