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RESEARCH PAPER

A Closer Look at the Nexus between Oil Price and Non-oil Revenue in Nigeria

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Abstract

This study investigates the effect of oil price variations on non-oil revenue performance in Nigeria, which, to our knowledge, has not received adequate empirical scrutiny. This issue is at the forefront of government policy plans, which seek to improve non-oil revenue inflows. Utilizing a dynamic time series modeling approach to analyze data from 2010M1 to 2020M12, the findings reveal that oil price dampens non-oil revenue mobilization efforts in the short run but is positive in the long run. This indicates that the Dutch disease hypothesis holds in the short run but not in the long run. In addition, a depreciation of the exchange rate was found to improve non-oil revenue inflows. Robustness checks using disaggregated non-oil revenue: trade taxes (import duties and levies) and domestic taxes (value-added tax, corporate, and personal income tax) validate the findings. Therefore, policy measures aimed at building up domestic revenue are required to minimize oil revenue dependency.

Keywords: Cointegration, Dutch Disease, Error Correction, Non-oil Revenue, Oil Price, Taxes.
JEL Classification: H20, H27, O40, C21.

1. Introduction

The monoculture nature of the Nigerian economy has been well documented in a plethora of studies and has over time remained dominated academic and policy discourse. Indeed, the Dutch disease syndrome infected the country following the discovery of oil, which was followed by a marked shift from a non-oil agrarian structure to a highly oil-dependent economy. The Nigerian has thereafter become susceptible to international oil price variations with a devastating impact on broad macroeconomic policy management. Crude oil earnings consistently accounted for over 90% of total revenue inflows for decades thereby crowding out non-oil revenue. According to the International Monetary Fund (IMF), the revenue base is simply too low to address the current challenges, and at 3-4% of GDP, Nigeria's non-oil revenue mobilization remains one of the lowest globally, reflecting

weaknesses in revenue administration systems and systemic non-compliance (IMF, 2019).

The resource curse of the 1970s, which spread across oil-rich countries, marked a turning point in Nigeria's economic history. This positive oil price shock accelerated oil exports thereby crowding out the non-oil sectors such as the agriculture and manufacturing sectors, which dominated exports at the time. The economy has since then been vulnerable to international oil market conditions. According to a study by Usman (2020), since mid-2014, the drop in oil price from US$111.63 in 2012 to US$52.32 in 2015 and the oil production shock that reduced Nigeria's oil output from 2.44 million bbl/day in 2010 to 2.12 million bbl/day in 2015 relaxed growth which in turn reduced non-oil revenue and foreign exchange reserves and disrupted private sector investment.

The price of oil stabilized at US$55 in 2016 before rising to US$64 in 2017 and moderating to US$59 in 2018. By 2020, the oil price had dropped to about $50. However, the share of non-oil revenue rose from about 20% in 2000 to approximately 44% in 2017 relative to the contribution from the oil sector and in absolute terms could be explained by improvements in tax collection (ibid.). This portrays an interesting scenario because higher oil prices seem to be associated with higher non-oil revenue. Yet, to our knowledge, this hypothesis has not received adequate empirical scrutiny, especially in the Nigerian context.

There have been several efforts made to diversify earnings from oil to non-oil earnings in Nigeria using different domestic revenue mobilization strategies. However, in addition to policy inertia, lack of political support for requisite reforms as well as weak governance and institutional frameworks have made these ambitious efforts a futile exercise. Despite policies by successive administrations to increase taxes and broaden the tax net, these reforms have not been sustainable given the huge backlash against these policies by stakeholders.

Nigeria has suffered a series of oil price shocks that exerted recessionary pressure at different times, but it seems policymakers did not learn. As the marginal propensity to save waned even in the face of high oil prices. The 2016 oil price and production shock and the COVID-19 pandemic-induced oil shock easily come to mind. The pattern and channels of impact are similar as the economy became overstretched as the fiscal space was constrained and the monetary policy transmission mechanism became weak due to excessive deficit monetization and undue foreign exchange market intervention in addition to grappling with multiple inefficient exchange rate windows.

In addition to oil earnings, Nigeria has a diversified source of non-oil revenue albeit a relatively infinitesimal share. The main non-oil revenue sources are an array of trade taxes, personal and company income tax, value-added tax, and other special taxes levied on oil companies. However, the issue of tax compliance, the

inefficiency of tax collection, and a narrow tax bracket have dampened the potential of non-oil revenue generation in the country due to crude oil dominance.

The political economy dynamics of fiscal management in Nigeria remain a source of concern and have constrained effective revenue mobilization due to *inter alia* numerous stakeholders and interests that are not often at an equilibrium. Moreover, the lack of political will or outright inability to implement critical reforms by the government is at the heart of Nigeria's fiscal quagmire as policymakers are unable to "walk the talk" and see through the elegant reforms often outlined on paper. They remain mere plans without any strong commitment or concrete steps to implement critical fiscal reforms sustainably. Nigeria's remarkable economic performance in the 2000s was driven by improvements in the non-oil sector through GDP diversification and requisite tax reforms.

Despite the plethora of evidence on the need for diversification from oil to non-oil revenue (Adedokun, 2018; Olayungbo and Olayemi, 2018; Omitogun et al., 2018; Ude and Agodi, 2020; Ilori and Akinwunmi, 2020; etc.), to our knowledge, no study has empirically investigated the link between oil price and non-oil revenue in Nigeria. An understanding of this nexus could provide new perspectives and guidance for policymakers who urgently seek to deploy sustainable domestic revenue mobilization strategies. From a methodological perspective, we use a dynamic time series modeling approach to examine the long- and short-run association between oil price variation and non-oil revenue. We test the notion that high oil prices stimulate economic activities because they allow the government to raise more revenue through consumption, corporate, and other taxes.

Following this introduction, section 2 provides a synoptic background of the paper while section 3 reviews related literature. Section 4 discusses the methodology while Section 5 presents and discusses the findings of the empirical analysis. Section 6 concludes and highlights some policy lessons.

1.1 Oil Price and Non-Oil Revenue Developments

According to information from the Office of the Accountant General of the Federation (OAGF), central government revenue rose on a year-on-year basis by about 47.5% and stood at N5.6 trillion (or US$13.7 billion) in 2021. At about 22%, total government revenue was below the projected budget estimate for 2021 and the central government revenue growth recorded in 2021 was mainly due to non-oil revenue that constituted about 28% of total revenue. The growth in non-oil revenue could be explained by increased custom receipts and VAT (which was raised from 5% to 7.5% in the 2020 Finance Act passed by the National Assembly). According to a World Bank Report, other sources of the central government non-

oil revenue which constitute 21% of the total such as personal income taxes of federal government workers and a share of surpluses from government-owned enterprises recorded remarkable improvement as they were 12% higher than the budget estimate in 2021.

Fiscal pressure emanates from the huge expenditure outlay. The central government's expenditure in 2021 was 13.5% higher than the budget estimate of N13.1 trillion (US$31.9 billion) in 2021. The recurrent component maintained its upward trend, rising to 40.9%. A significant share of government spending tilts towards debt servicing and in 2021, the interest payment to revenue ratio was 75%. In other words, the central government used N750 out of every N1,000 revenue generated to finance its debts. The combined effect of revenue shortage and increased expenditure (especially capital and recurrent debt) resulted in a deficit of N7.4 trillion (equivalent to 5.7% of GDP) in 2021.

As shown in Figure 1, while trade taxes such as import duties, fees, and levies have maintained a very slow upward movement during the review period albeit with slight fluctuations, other taxes made up of personal income tax, value-added tax, corporate income tax, amongst others have primarily driven the total non-oil revenue inflows. The chart shows that from January 2010 to April 2015, there seemed to be a divergence in the movement of non-oil revenue and oil price, but a similar trend was observed thereafter, indicating that oil price may be correlated with non-oil activities.

The need to address fiscal pressure through domestic revenue mobilization has been at the forefront of the government's development agenda. With a huge financial outlay and budgetary requirement compounded by fuel subsidies, efforts toward revenue diversification have weakened the fiscal outlook and magnified risks.

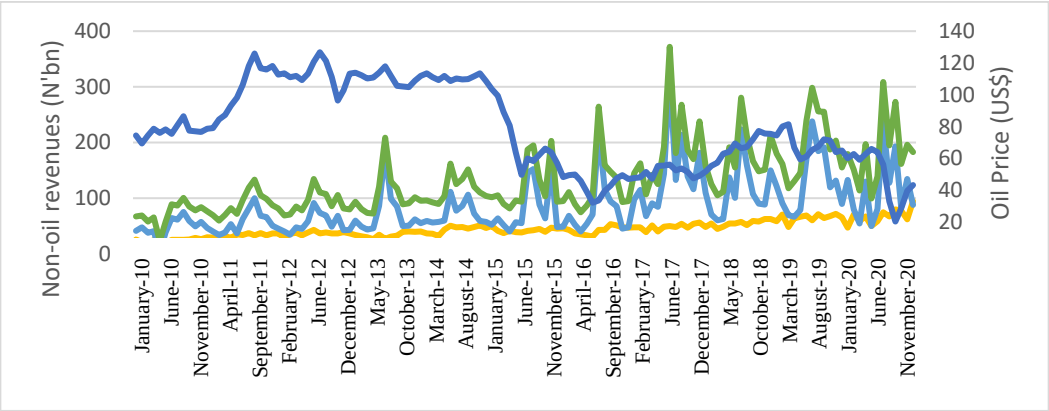
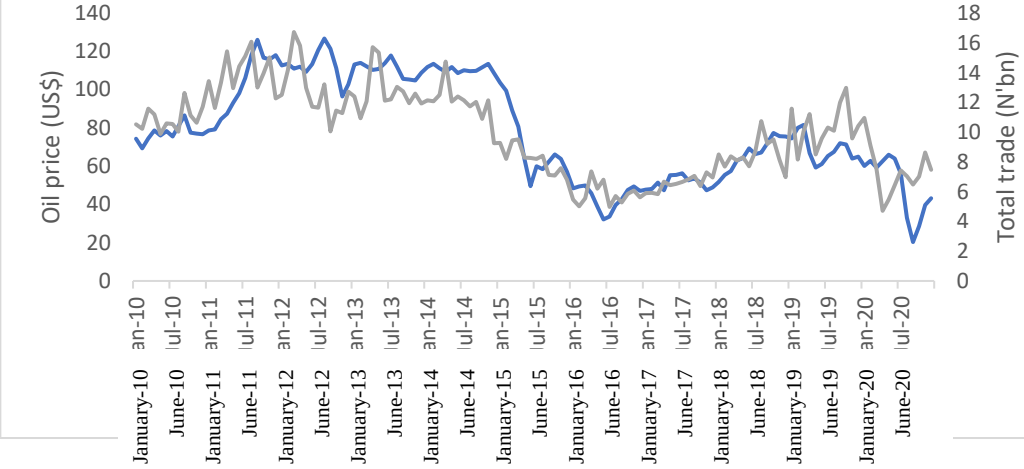


Figure 1. Trend of Oil Price and Non-Oil Revenues
Source: Central Bank of Nigeria and Office of the Accountant General of the Federation.

Faced with lingering macroeconomic and broader development challenges that have been magnified by the slow recovery from the covid-19 pandemic, the fiscal outlook for Nigeria remains bleak. For instance, the suspension of the planned fuel subsidy removal and delay in other macroeconomic reforms have magnified fiscal risks. Even in the presence of favorable oil prices in the global market occasioned by the Russia-Ukraine crisis, the absence of urgent fiscal reforms will continue to erode the expected gains from higher crude oil prices. These issues have intensified the need to strengthen domestic resource mobilization and improve tax administration in Nigeria.

As pointed out by Holtz and Ordu (2021), "Indeed, ensuring more effective domestic resource mobilization and tax administration systems—sources of revenue that governments have direct control over-via fiscal decentralization reforms can offer an avenue to simultaneously bolster government coffers, improve the impact of government spending, capture uncollected tax revenue spillage, and augment taxation's prominent role as a source of development financing." They argue that the experience of relatively well-executed fiscal decentralization in Brazil and Indonesia provides evidence that fiscal decentralization has the potential to improve the collection and spending of domestic tax and non-tax government revenue as well as improve accountability.

Figure 2 reveals crude oil dominance in Nigeria's total trade (over 90% of total exports) profile as oil prices seemed to dictate the movement of trade. With a somewhat managed float exchange rate regime, Figure 3 shows no co-movement between exchange rate and oil price fluctuations. The government has recognized the need to boost its revenue base and therefore established the Strategic Revenue Growth Initiative (SRGI) in 2020 to identify and exploit sources that can help diversify the income earnings of the government towards achieving a target revenue-to-GDP ratio of 15% by 2023. The SGRI seeks to leverage improved technology and digitization to enhance operational efficiency across the various revenue collection streams. Taxation remains a reliable and sustainable means of ramping up revenue.



Source: Central Bank of Nigeria.

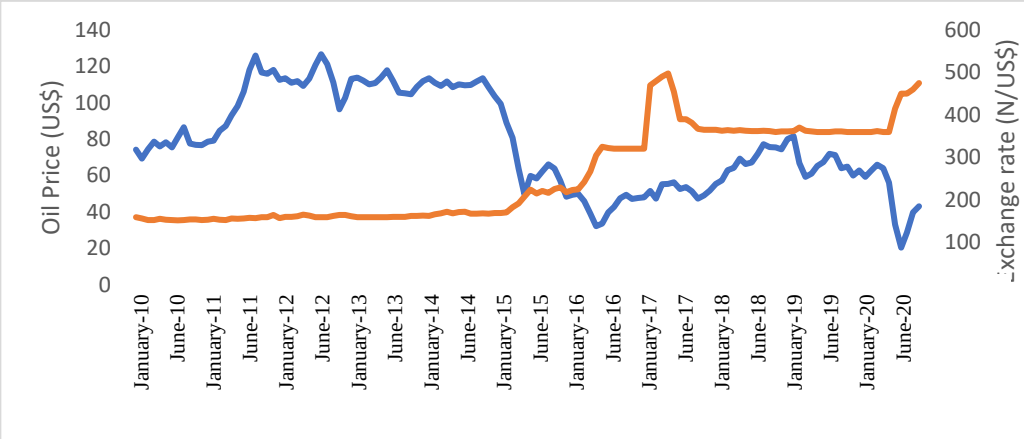


Figure 3. Exchange Rate and Oil Price Movement
Source: Central Bank of Nigeria.

2. Literature Review

2.1 Theoretical Issues

The link between oil price and non-oil revenue can be traced to early theoretical expositions of the Dutch Disease proposed by Corden and Neary (1982). The model assumes that an economy experiencing an export boom has a tradable and non-tradable sector. The former has the prosperous export sector and the faltering sector while the latter focuses on the domestic market including services, construction, trade, etc. The model argues that the booming sector crowds out the traditional export sector.

A juxtaposition of this model to the Nigerian experience suggests a jump in the country's oil exports raises income and stimulates higher foreign exchange earnings. If the accumulated income is entirely used to finance imports rather than invested in high return investments that can generate wealth, this could slow down

the economy due to low demand for domestically produced goods. If, however, the income generated from the commodity export boom is converted to domestic currency and invested in the non-tradable sector, the impact would depend on the exchange rate regime adopted. Under a fixed exchange rate regime, the conversion of foreign currency to local currency would increase the country's money supply thereby magnifying inflationary pressure. This would lead to an appreciation of the real exchange rate. If the exchange rate regime is flexible, the high inflow of foreign currency drives the value of the domestic currency (an appreciation) but in this case through the nominal exchange rate channel and not the price channel. Under both regimes, the real exchange rate appreciation would affect the country's export competitiveness thereby affecting the export capacity of traditional sectors (Ebrahimzadeh, 2024).

Summarily, in addition to this spending effect is the resource reallocation effect where the export boom leads to a shift of factors of production from the traditional sector to the booming export sector. In order words, labor and capital are employed in the production of domestic goods that are not traded internationally in the booming export sector. Both effects result in a fall in the output share of non-resource tradable relative to non-tradable and a real exchange rate appreciation—that is, a rise in the price of non-tradable relative to that of tradable (Brahmbhatt et al., 2010).

As pointed out by Ianchovichina and Onder (2017), oil exporters that suffer from an appreciated exchange rate, a narrow industrial base, and a skewed distribution of productive capacity in favor of non-tradable sectors are particularly vulnerable to a long "winter" of low oil prices. Without a diversified export base, these countries' macroeconomic performance quickly worsens and their residents experience income losses (ibid). Behzadan et al. (2017) show that the Dutch disease can arise solely from inequality in the distribution of natural resource rents. Given two otherwise identical countries that differ only in the ownership shares of the natural resource rents, the country with the less equal distribution will have less production of manufacturing goods and less development of learning-by-doing in this sector.

2.2 Empirical Outcomes

The empirical literature examining whether the Dutch disease holds has been widely conducted especially in cross-country contexts. Reisinezhad (2020) uses a dynamic panel data approach for a sample of 132 countries between 1970 and 2014 to examine the symptoms of the Dutch disease. Contrary to empirical evidence, the Dutch disease hypothesis, driven by learning by doing, does not predict the steady-state real exchange rate appreciation and economic growth deceleration due to a

resource boom. Javaid (2009) finds that the Dutch Disease hypothesis holds in selected Southeast Asian countries based on panel data analysis of data from 1981 to 2007.

Alssadek and Benhin (2021) examined the Dutch disease in a global sample of 36 oil-rich developed and developing countries from 1970 to 2016. Using the panel data fixed effect approach; the study showed that an oil boom leads to an appreciation in the real exchange rate and a fall in sectoral output, suggesting that the hypothesis holds. However, there is significant heterogeneity across the spending and factor reallocation effects across sub-regions, which the authors ascribe to differences in institutional quality and economic policy. While some studies have shown evidence that the Dutch disease holds in Niger (Gbatsoron and Raymond, 2017; and Nweke, 2015), others posit that it is the Nigerian disease (a reflection of significant institutional quality deficit) that holds (Mustapha and Masih, 2015).

Several other studies have tried to examine the link between non-oil revenue and oil price on economic growth. Adedokun (2018) opines that oil revenue and government spending in Nigeria respond to oil price shocks, while government expenditure equally responds to oil revenue shocks. Using a structural VAR model to analyze data between 1981 and 2014, findings show that a significant share of variation in oil revenue is explained by the shocks to the oil price. That is, oil price shocks are the principal variable that explains the variation in oil revenue with 69% and about 48% in the first and tenth year respectively, which implies it has strong explanatory power, both in the short and long run. Notably, this study did not consider the impact of oil prices on non-oil revenue which is very critical for domestic revenue mobilization with implications for diversification efforts. Olayungbo and Olayemi (2018) analyzed the linkage between non-oil revenue, public expenditure, and output performance in Nigeria between 1981 and 2015 using VAR, error correction, and Granger causality techniques. The results showed that non-oil revenue has a positive and significant impact on economic growth. However, the impulse response function analysis showed that GDP responded negatively to non-oil revenue shocks over the forecast horizon. This study did not consider how oil prices affect non-oil revenue.

Ilori and Akinwunmi (2020) used a dynamic modeling approach to investigate the association between oil and non-oil revenue on economic growth in Nigeria and found that both oil and non-oil revenue exert a negative impact on gross domestic product. Nigeria's export is dominated by oil and therefore, one would expect the price of oil to be positively related to revenue. Nwosa and Ogunlowore (2013) assess the impact of oil revenue on non-oil export in Nigeria for the period 1970 to 2011. The findings show that oil revenue exerts a negative and significant impact on non-oil exports in Nigeria. Omesi et al. (2020) analyze

the nexus between non-oil revenue and the economic development of Nigeria using data for the period 1989-2018. The results showed that non-oil revenue exerts a positive and significant impact on GDP. Omitogun et al. (2018) investigate the relationship between oil price, revenue variation, and economic growth in Nigeria to analyze data between 1981 and 2016. Using the ARDL approach, the short-run result shows that oil price and oil revenue positively and significantly affect economic growth while the long-run estimates indicate that oil price and oil revenue exert accordingly, a positive and negative effect on economic growth.

Soile and Babajide (2015) examine the impact of oil price shocks on some macroeconomic variables, which serve as proxies for economic activities in Nigeria for the period 1980Q1-2011Q4. The empirical analysis using the VAR framework shows that oil price shocks hurt the trade balance, inflation, government revenue, and exchange rate. The findings suggest that oil price decreases affect macroeconomic activity in Nigeria, but this inference was drawn based on total revenue and did not consider non-oil revenue. Omran et al. (2015) analyzed the determinants of non-oil exports in Sudan for the period 1990-2012 using the OLS technique and the results indicate that Real Gross Domestic Product, the Exchange rate, and Trade Openness (OP) were found to exert a positive effect on non-oil exports in Sudan. Taha et al. (2011) assessed the effects of economic growth on government tax revenue in Malaysia during the period 1970-2009. The findings reveal that there is a unidirectional relationship between economic growth and total government tax revenue with a 21% speed of adjustment in the short run to reach an equilibrium level in the long run.

Based on the foregoing, there seems to be a paucity of studies that explicitly assess the nexus between oil price and non-oil revenue, particularly in Nigeria. The focus of most studies has been on the link between oil price and non-oil revenue on economic growth. This paper fills this gap and partly contributes to the debate on the impact of the oil price movement on the Nigerian economy.

3. Methodology

3.1 Analytical Framework and Model Specification

This paper leans on the Dutch Disease hypothesis, which reflects a “resource curse” or “paradox of plenty” and connotes the negative consequences of large increments in a country’s income. This hypothesis became rife in Nigeria following the discovery of crude oil and the subsequent neglect of the non-oil sector. The large inflow of petro-dollars reduced the competitiveness of non-oil exports in international markets. Consequently, import dependency increased as the productive capacity of the economy declined while oil revenue crowded out other sources of government income. The foregoing suggests that the Dutch

disease would hold if higher oil prices led to a reduction in non-oil revenue while a positive relationship would suggest that the hypothesis does not hold.

Therefore, we lean on the tax-spend postulation by Haveman and Zellner (1978) and adapted for Nigeria by Ibrahim (2018). However, we depart from extant specifications by expressing non-oil revenue as a function of oil price, which we assume largely, determines government expenditure in Nigeria, and control for the exchange rate, income, and trade effects. The models are specified as follows:

$$TOTNOR_t = \alpha_0 + \alpha_1 OP + \alpha_2 EXR + \alpha_3 TOTTRAD + \alpha_4 CPS + \mu \quad (1)$$

where TOTNOR is total non-oil revenue which comprises trade taxes (import duties, excise and levies), OP is the international price of crude oil (bonny light), EXR means the US dollar-naira (domestic currency) exchange rate, TOTTRAD implies total trade flows (sum of exports and imports), CPS implies total credit made available to the private sector by the financial institutions while μ and α_i are the error term and model parameters. The monthly data series used were sourced from the Central Bank of Nigeria and the Office of the Accountant General of the Federation. While we acknowledge the critical role of economic size (GDP) in explaining non-oil revenue performance, this variable was not included because the monthly series was not available.

The exchange rate plays an important role in explaining Nigeria's revenue profile because the country's major export earnings are in US dollars which must be converted to naira before its distribution to the various tiers of government. Therefore, an appreciation of the domestic currency would reduce revenue while a depreciation would increase revenue inflows. It is also important to control for income effects because an increase in GDP indicates more economic activities and potentially increases opportunities for taxation thereby opening other sources of non-oil revenue for the government. Therefore, we predict that there is a positive relationship between exchange rate and non-oil revenue.

The volume of trade also plays an important revenue generation role through trade taxes and levies. Thus, the coefficient of trade flows is expected to be positive, and this is because higher trade flows could increase non-oil revenue due to production taxes on export-oriented firms as well as taxes on imported intermediates and finished goods. Gbenga et al (2019) and Olowofeso et al. (2015) have shown that there is a positive and significant relationship between private sector credit and GDP in the long and short run in Nigeria. Therefore, in the absence of a quarterly GDP series, we use CPS as an indicator of economic activity. Thus, more credit to the private sector indicates higher firm-level investment, which in turn provides many opportunities to raise revenue through corporate taxes as well as value-added taxes due to higher productivity and consumption. The need for improved lending to the private sector due to economic

shocks cannot be over-emphasized especially due to heightened macroeconomic vulnerabilities and fiscal risks.

3.2 Estimation Procedures

The paper starts with preliminary diagnostics such as descriptive statistics, correlation matrix, and unit root tests to understand the underlying data-generating process. This provides insights and guidance regarding the functional form of the model to adopt as well as relevant data transformations to execute. The unit root tests are conducted with and without structural breaks to ascertain the stationarity property of the series. The study relies on the Augmented Dickey-Fuller (ADF) and Philip Perron (PP) unit root test to ascertain the presence of unit root or otherwise of the variables. The PP test assumptions are similar to the ADF tests but differ because it uses the Newey-West non-parametric method to control for autocorrelation rather than the inclusion of the lagged dependent variable as in the case of the ADF test. For both tests, the null hypothesis is that the variables being considered to have a unit root against an alternative that they do not, and the test equations are specified as follows:

ADF: $\Delta y_t = \alpha_0 + \alpha_1 T + \gamma y_{t-1} + \beta_i \sum_{i=1}^{p} \phi_t \, \Delta y_{t-1} + \mu_t$ (2)

PP: $\Delta y_t = \alpha y_{t-1} + x_t' \delta + \mu_t$ (3)

where y_t is the variable considered, T is the time trend, x_t' are optional exogenous regressors, μ_t is the error term while α, δ, β_i, ϕ_t are parameters. We also supplement these tests using the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) because the dependent variable is assumed to be trend-stationary based on the null hypothesis. The test draws on the residuals from the least square regression of the dependent variable on regressors, and this is $y_t = x_t' \delta + \mu_t$ while the corresponding Lagrange Multiplier (LM) statistic is $LM = \sum_t \frac{s(t)^2}{T^2 f_0}$. The variable f_0 is an estimator of the residual spectrum at zero frequency and $s(t)$ is a cumulative residual function.

Next, the ARDL bounds testing approach to cointegration and error correction proposed by Pesaran et al. (2001) is used. The F-statistic is a generalized Dickey-Fuller type regression used to test the significance of the lagged level of variables under consideration in an unrestricted error correction model (Narayan and Narayan, 2004). This technique is more appropriate compared to other cointegration techniques not only due to the small sample size property but also because it allows testing for long-run relationships irrespective of the order of integration of these variables. The estimated F-statistic is checked against the critical values reported by Pesaran et al. (2001). If the F-statistic exceeds the upper bound, we reject the null hypothesis of no cointegration.

To obtain the long-run cointegrating regression, apply the fully modified OLS proposed by Philips and Hansen (1990) which provides more optimal estimates of cointegrating relationships. The approach modifies least squares to account for autocorrelation effects and endogeneity in the regressors that result from the existence of a cointegrating relationship. Also, the general framework makes it possible to study the asymptotic behavior of FMOLS in models with the full rank I(1) regressors, models with I(1) and I(0) regressors, models with unit roots, models with only stationary regressors and models with I(1) and I(0) regressors as well as deterministic trends (Philips, 1993).

4. Discussion of Findings

4.1 Data and Preliminary Diagnostics

The paper uses monthly data between 2010 and 2020 with data on the exchange rate, oil price, credit to the private sector, and total trade drawn from the Central Bank of Nigeria (CBN) while data on non-oil revenue, taxes, and trade taxes are obtained from the office of the accountant general of the federation (OAGF). The summary statistics for the variables presented in Table 1 show that the average value of oil price (LOP) is 4.3 and ranges from a maximum of 4.8 to a minimum of 3. The standard deviation of about 0.37 suggests that oil price is spread out over a large range of values indicating significant disparity.

The average total non-oil revenue (LTOTNOR) was about 4.8 and was mainly driven by the mean of trade tax income (LTAXREV) which recorded 3.7 compared with the average value of custom taxes (LTRADTAX). The standard deviation of non-oil revenue and its component indicate significant disparity, and this is corroborated by the minimum and maximum values recorded. Total trade flows (LTOTTRAD) and exchange rates (LEXR) recorded averages of 2.3 and 5.5, respectively.

Table 1. Summary Statistics

	LCPS	LEXR	LOP	LTAXREV	LTOTNOR	LTOTTRAD	LTRADTAX
Mean	9.792	5.461	4.299	4.320	4.791	2.250	3.749
Maximum	10.322	6.211	4.842	5.774	5.919	2.817	4.549
Minimum	9.125	5.021	3.013	1.049	3.146	1.551	2.933
Std. Dev.	0.325	0.409	0.374	0.575	0.433	0.309	0.320
Skewness	-0.474	0.304	-0.541	-0.924	0.037	-0.307	-0.134
Kurtosis	2.323	1.384	2.935	9.600	3.634	2.084	2.718
J-B	7.460	16.405	6.458	258.371	2.241	6.692	0.835
Probability	0.024	0.000	0.040	0.000	0.326	0.035	0.659
Obs.	132	132	132	132	132	132	132

Source: Research finding.

Note: Obs. means observation, J-B means Jarque Bera, Std. Dev. Means standard deviation.

The correlation between the variables is presented in Table 2. The correlation between total non-oil revenue (LTOTNOR) and oil price (LOP) is -42%, and this suggests that oil price might exert a negative impact on non-oil revenue, and this is reinforced by the negative correlation between oil price and trade tax revenue (-35%) and other tax revenues (-44%). Only the total trade flows (TOTTRAD) were found to have a positive correlation (81%) with the oil price.

Table 2. Correlation Matrix

	LEXR	LTAXREV	LCPS	LTRADTAX	LOP	LTOTNOR	LTOTTRAD
LEXR	1.00	0.58	0.86	0.77	-0.75	0.70	-0.69
LTAXREV	0.58	1.00	0.58	0.61	-0.35	0.96	-0.32
LCPS	0.86	0.58	1.00	0.88	-0.58	0.71	-0.63
LTRADTAX	0.77	0.61	0.88	1.00	-0.44	0.77	-0.44
LOP	-0.75	-0.35	-0.58	-0.44	1.00	-0.42	0.81
LTOTNOR	0.70	0.96	0.71	0.77	-0.42	1.00	-0.40
LTOTTRAD	-0.69	-0.32	-0.63	-0.44	0.81	-0.40	1.00

Source: Research finding.

The ADF and PP stationarity test results shown in Table 3 reveal that all the variables are stationary at the first difference, which implies that they are I(1) variables. This excludes tax revenue and total non-oil revenue that were found to be stationary at levels. Based on the KPSS test result also reported in the table, the variables become stationary after taking the first difference. From the result of unit root test with a structural break, we conclude that the endogenously identified

structural breaks in the series are not strong enough to be significantly different from the outcome of the conventional unit root tests.

Table 3. Unit Root Test

	ADF		**PP**		**KPSS**	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
EXR	-0.193	-9.157*	0.010	-9.211*	1.283	0.163*
TAXREV	-6.042*	-8.760*	-5.949*	-75.065*	1.407	0.228*
TRADTAX	-1.552	-18.928*	-1.510	-25.991*	1.318	0.192*
OP	-1.198	-8.923*	-1.367	-7.572*	0.781	0.126*
TOTNOR	-1.506	-9.411*	-4.508*	-61.426*	1.438	0.142*
TOTTRAD	-1.980	-15.142*	-2.128	-17.230*	0.760	0.104*
CPS	-0.848	-8.925*	-0.778	-8.930*	1.343	0.063*

Source: Research finding.

Table 4. Stationarity Test with Structural Break

	level		**first diff**	
	t-stat.	Break	t-stat.	Break
EXR	-3.185	2016M03	-13.250*	2017M03
TAXREV	-7.988*	2010M05	-17.707*	2010M05
TRADTAX	-3.379	2016M06	-19.763*	2020M01
OILP	-3.588	2015M07	-9.875*	2020M09
TOTNOR	-6.834*	2016M06	-15.765*	2010M05
TOTTRAD	-4.918*	2014M11	-15.478*	2016M04
CPS	-2.830	2011M07	-10.462*	2011M12

Source: Research finding.

4.2 Empirical Results

The bounds testing approach to testing long-run equilibrium relationships is based on the Wald test. In this case, the joint significance of coefficients for lagged variables is tested using the F-statistic computed under the null hypothesis of no cointegration[1]. Table 6 shows that there exists a long-run equilibrium relationship between oil price and non-oil revenue (tax and trade taxes). Given the presence of a long-run cointegrating relationship in three models, we derive the long-run elasticities of total non-oil revenue, tax revenue, and trade taxes to the selected variables using the fully modified OLS approach of Philip and Hansen (1990).

1. The distribution of the test statistics under the null is non-standard, in which critical values depend on the order of integration of variables involved

Table 5. Bound Test for Cointegration

	Model 1: TOTNOR	**Model 2: TAXREV**	**Model 3: TRADTAX**
F-Stat.	11.383	11.600	5.113
K (lags)	4	4	4
Sample size:	127	131	130
	Significance	**Lower bound**	**Upper bound**
	10%	2.20	3.09
	5%	2.56	3.49
	1%	3.29	4.37

Source: Research finding.

Table 6 presents the fully modified OLS estimation results, which is an improvement over OLS-based long-run cointegrating equations because it accounts for simultaneity bias. In the first model with total non-oil revenue (TOTNOR) as the dependent variable, the coefficient of oil price is positive and significantly related to total non-oil revenue inflows in Nigeria during the review period. Similar findings are recorded when nonoil revenue is disaggregated into general taxes and trade taxes (import duties and levies). This means that higher oil prices could stimulate non-oil activities in the long run perhaps due to tax opportunities created by higher investments induced by positive oil shocks. The result also indicates that a depreciation of the exchange rate is associated with an increase in non-oil revenue inflows over the long term just as higher trade flows were found to significantly increase non-oil revenue. These findings were significant at the 5% level. The result tallies with extant studies such as Soile and Babajide (2015) and Adedokun (2018) who find that oil price shocks dampen macroeconomic activity in Nigeria. Our findings suggest that the Dutch hypothesis does not hold in the long run, and this is corroborated by the positive effect of the exchange rate rather than an appreciation effect. This is consistent with the fact that Nigeria has over the years operated a managed float exchange rate regime and thus, a real exchange rate appreciation (that is, a negative exchange rate coefficient) would have affected the country's export competitiveness thereby affecting the export capacity of traditional sectors.

Table 6. Fully Modified OLS

	Model 1: TOTNOR	**Model 2: TAXREV**	**Model 3: TRADTAX**
	coeff. (S.E)	**coeff. (S.E)**	**coeff. (S.E)**
LOP	0.234*(0.097)	0.304*(0.124)	0.234*(0.092)
LEXR	0.522*(0.139)	0.644*(0.178)	0.287*(0.132)
LTOTTRAD	0.567*(0.143)	0.561*(0.183)	0.730*(0.135)
C	-4.614*(1.114)	-5.993*(1.424)	-5.974*(1.052)

Source: Research finding.

The outcome of the short-run analysis is presented in Table 7, but the coefficient of oil price seems to be significant with deeper lags. The 1st and 3rd lags of the oil price are negative and significantly explain the variation in total non-oil revenue inflows in Nigeria (model 1); suggesting that oil price tends to crowd out the potential of non-oil revenue generation in the short run. However, the coefficient of the 4th lag is positive meaning that the effect of oil price could exert a significant positive impact on non-oil revenue generation at least four months after the initial shock. The effect of oil price is similar across models 2 and 3 where tax revenue and total trade taxes are the dependent variables total.

The negative impact of the oil price indicates that the Dutch disease hypothesis holds in the short term, and this is reinforced by the negative coefficient of the exchange rate at levels, indicating that a depreciation of the naira US dollar exchange rate leads to a reduction of non-oil revenue by about 0.97% but the subsequent appreciation observed in the 4th led to an increase in non-oil revenue by 1.92%.

Table 7. Short-Run Error Correction Model

	Model 1: TOTNOR	**Model 2: TAXREV**	**Model 3: TRADTAX**
	coeff. (S.E)	**coeff. (S.E)**	**coeff. (S.E)**
C	-1.256*(0.155)	-2.916*(0.347)	0.410*(0.069)
D(LOP)	0.001(0.243)	-0.105(0.316)	0.052(0.113)
D(LOP(-1))	-0.469*(0.265)	0.036(0.917)	-0.234*(0.125)
D(LOP(-2))	0.213(0.267)	-0.340(0.350)	0.400*(0.126)
D(LOP(-3))	-0.806*(0.283)	-0.891*(0.381)	-0.331*(0.133)
D(LOP(-4))	0.857*(0.302)	1.492*(0.415)	0.213(0.138)
D(LOP(-5))		-0.945*(0.428)	
D(LEXR)	-0.977*(0.493)	-1.196*(0.667)	-0.638*(0.227)
D(LEXR(-1))	0.319(0.526)		0.420*(0.239)13
D(LEXR(-2))	-0.548(0.523)		-0.408*(0.241)
D(LEXR(-3))	1.292*(0.516)		0.530*(0.240)
D(LCPS)	0.337(0.857)		
D(LCPS(-1))	1.227(0.877)		
D(LCPS(-2))	-1.875*(0.077)		
D(LTOTTRAD)		-0.399*(0.216)	-0.099(0.072)
D(LTAXREV(-1))	0.346*(0.092)		
D(LTAXREV(-2))	0.300*(0.080)		
D(LTAXREV(-3))	0.279*(0.068)		
ECT	-0.643*(0.077)	-0.940*(0.111)	-0.568*(0.076)
Diagnostics			
Normality	8.046	9.731	5.292
Autocorrelation	1.880	2.928	0.811
Heteros.: ARCH	0.259	1.152	0.831
Heteros.: White	1.515	1.494	1.185
Reset	0.525	3.269	0.055

Source: Research finding.

The model performs satisfactorily as indicated by the absence of serial correlation, heteroscedasticity, and other post-estimation diagnostic tests conducted (Table 7). The error correction terms are negative and statistically significant. This validates the long-run results and implies that the speed of adjustment to any contemporaneous disequilibrium or distortion is quite fast. The parameter stability test in Figure 4 shows that the estimated models are stable over the sample period. The findings generally point to the fact that the Dutch disease does not hold in the long run but holds in the short run in Nigeria. This reflects Nigeria's poor savings culture over the years during oil boom periods as well as the shift from non-oil towards the oil sector.

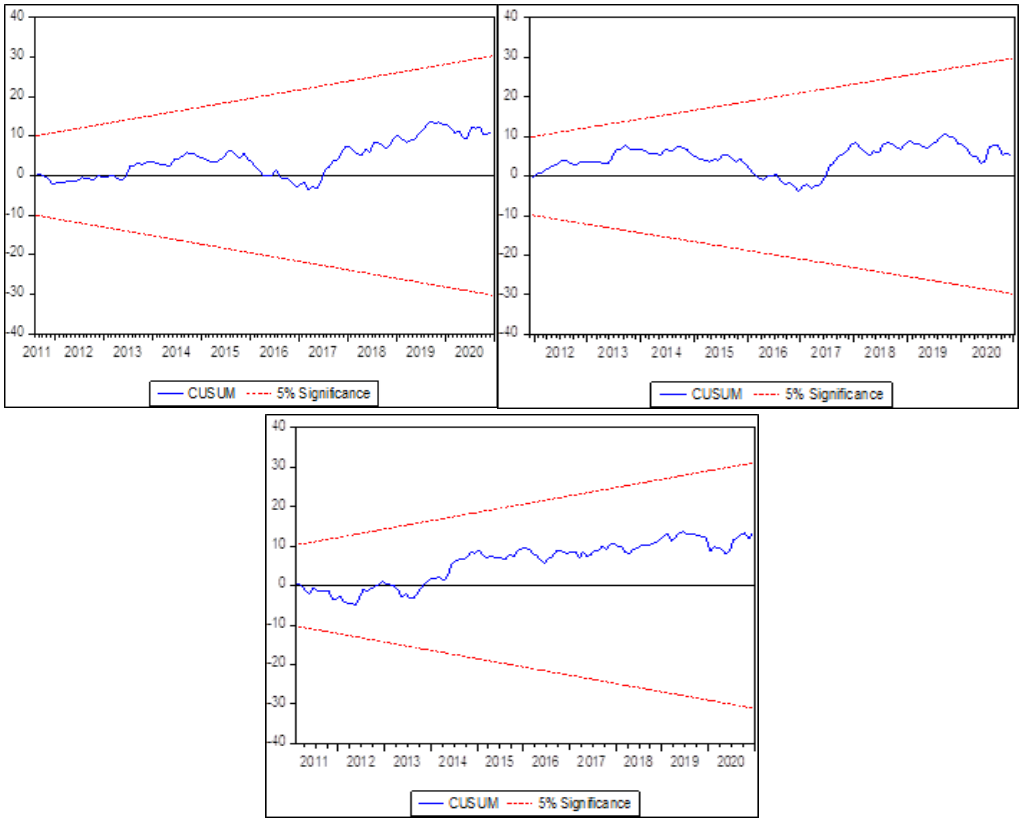


Figure 4. Parameter Stability Check
Source: Research finding.

5. Conclusion

The effect of oil prices on different macroeconomic variables has been well documented in Nigeria. However, its impact on non-oil revenue has surprisingly not received any attention. The study empirically investigates the hypothesis that oil price stimulates government non-oil revenue in Nigeria. This is because higher oil prices could increase government revenue which creates more room for fiscal expansion. Consequently, economic activities are stimulated in the non-oil sectors, which in turn creates tax opportunities for the government through corporate taxes, and import duties because most firms in Nigeria rely on the import of intermediate inputs in their production process.

The empirical analysis revealed that oil prices positively affect non-oil revenue and its sub-components in the long run in Nigeria. However, the short-run analysis revealed that the effect of oil price on non-oil revenue and its components is mixed with longer lags carrying a positive sign while relatively shorter lags exerted a negative impact. This means that it could take at least 4 months for the impact of oil price shocks on non-oil revenue to materialize. These findings prompt an interesting agenda for future studies. For example, the divergent impact

observed in the short run suggests that asymmetries matter and therefore, a non-linear model that decomposes positive and negative shocks may better capture the dynamic effects.

These results imply that although over-reliance of the Nigerian economy on oil revenue magnifies risks from global oil price shocks, there are potential opportunities for boosting the economic activities in the non-oil sector especially if bold reforms are implemented by the government. The findings make a case for the government to strengthen and scale up revenue diversification efforts. For instance, the finding that an exchange rate depreciation exerts a positive effect on non-oil revenue provides more room for the government to increase earnings in the federation account for onward distribution to the three tiers of government. The exchange rate effect could also be traced to lower domestic costs since a depreciation. The short-term negative effect of credit to the private sector on non-oil revenue inflows reduces tax inflows from the firm due to limited access to credit to scale up their production. The results indicate that government could consider a more liberal trade policy stance over the long run as higher trade flows contribute positively to revenue diversification. The positive impact of oil price on non-oil revenue suggests that the Dutch Disease holds in Nigeria and thus makes a case for the government to urgently diversify its exports and minimize oil dependency.

References

Adedokun, A. (2018). The Effects of Oil Shocks on Government Expenditures and Government Revenues Nexus in Nigeria (with Exogeneity Restrictions). *Future Business Journal, 4*, 219–232.

Alssadek, U. S., & Benhin, P. K. (2021). Oil Boom, Exchange Rate, and Sectoral Output: An Empirical Analysis of the Dutch Disease in Oil-Rich Countries. *Resources Policy, 74*(C), 1-14.

Soile, I., & Babajide, N. (2015). Oil Price Shocks and Nigeria's Economic Activity: Evidence from ARDL Cointegration and VECM Analysis. Retrieved from https://ssrn.com/abstract=2624004

Behzadan, N., Chisik, R., Onder, H., & Battaile, B. (2017) Does Inequality Drive the Dutch Disease? Theory and Evidence. *Journal of International Economics, 106*, 104-118.

Brahmbhatt, M., Canuto, O., & Vostroknutova, E. (2010) Dealing with Dutch Disease. *World Bank Poverty Reduction and Economic Management Network (PREM)*, Retrieved from https://openknowledge.worldbank.org/handle/10986/10174

Corden, W. M., & Neary, J. P. (1982), Booming Sector and De-Industrialization in a Small Open Economy. *Economic Journal, 92*(368), 825-48.

Haveman, R. H., & Zellner, B. B. (1978). The Limitations of Tax Limitations. In Friedman, M. (Ed.). *Policy Studies: Review Annual* (7-14). London: Routledge

Ebrahimzadeh, C. (2024). Dutch Disease: Wealth Managed Unwisely. Retrieved from https://www.imf.org/en/Publications/fandd/issues/Series/Back-to-Basics/Dutch-Disease

Gbatsoron, T., & Raymond, H. (2017). An Economic Analysis of Dutch Disease in Nigeria. *CARD International Journal of Management Studies, Business, and Entrepreneurship Research, 2*(1), 75-90.

Gbenga, O., James, S. O., & Adeyinka, A. J. (2019). Determinant of Private Sector Credit and Its Implication on Economic Growth in Nigeria: 2000-2017. *American Economic & Social Review, 5*(1), 10-20.

Holtz, L., & Uche Ordu, A. (2021). The Role of Fiscal Decentralization in Promoting Effective Domestic Resource Mobilization in Africa. Retrieved from https://www.brookings.edu/articles/the-role-of-fiscal-decentralization-in-promoting-effective-domestic-resource-mobilization-in-africa/

Ibrahim, T. M. (2018). Government Expenditure-Revenue Nexus Reconsidered for Nigeria: Does Structural Break Matter? Retrieved from https://mpra.ub.uni-muenchen.de/id/eprint/86220

Ilori, S. A., & Akinwunmi, A. (2020) Determinants of Non-Oil Export and Economic Growth in Nigeria: An Application of the Bound Test Approach. *Journal for the Advancement of Developing Economies, 3,* 69-83.

Ianchovichina, E., & Onder, H. (2017). Dutch Disease: An Economic Illness Easy to Catch, Difficult to Cure. *Brookings Institute Future Development*, Retrieved from https://www.brookings.edu/blog/future-development/2017/10/31/dutch-disease-an-economic-illness-easy-to-catch-difficult-to-cure/

International Monetary Fund (IMF). (2019). Nigeria: Mobilizing Resources to Invest in People. Retrieved from https://www.imf.org/en/News/Articles/2019/04/01/na040219-nigeria-mobilizing-resources-to-invest-in-people

Javaid, M. (2009). Dutch Disease Investigated; Empirical Evidence from Selected Southeast Asian Economies. *Central Bank of Sri Lanka International Conference*, Retrieved from https://www.cbsl.gov.lk/sites/default/files/Dutch_Disease_Full.pdf

Mustapha, I. M., & Masih, M. (2016). Dutch Disease or Nigerian Disease: A Prima Facie? New Evidence from ARDL Bound Test Analysis. *MPRA Research Paper*, Retrieved from https://mpra.ub.uni-muenchen.de/69767/

Narayan, S., & Narayan, P. K. (2004) Determinants of Demand for Fiji's Exports: An Empirical Investigation. *The Developing Economics, XLII*(I), 95-112.

Nweke, K. D. (2015). The Nigerian Economy and the Dutch Disease. ETD Collection for University of Texas, El Paso. AAI1600337. Retrieved from https://scholarworks.utep.edu/dissertations/AAI1600337/

Nwosa, P. I., & Ogunlowore, A. J. (2013) Has Oil Revenue Enhanced Non-Oil Export in Nigeria? A Cointegration Approach. *Journal of Economics and Development Studies, 1*(3), 41- 46.

Ude, D. K., & Agodi, J. E. (2020). Investigation of the Impact of Non-Oil Revenue on Economic Growth in Nigeria. *International Journal of Science and Research, 3*(11), 2571-2577.

Olayungbo, D. O., & Olayemi, O. F. (2018). Dynamic Relationships among Non-Oil Revenue, Government Spending, and Economic Growth in an Oil-Producing Country: Evidence from Nigeria. *Future Business Journal, 4*, 246–260.

Olowofeso, H., Adeleke, A. O., & Udoji, A. O. (2015). Impact of Private Sector Credit on Economic Growth in Nigeria; Central Bank of Nigeria. *Journal of Applied Statistics, 6*(2) 81-101.

Omesi, M. J., Ngoke, C., & Ordu, S. (2020) Non-Oil Revenue and Economic Development of Nigeria. *International Journal of Innovative Development, 9*(1), 91-99.

Omitogun, V. A., Longe, M., & Muhammad, O. F. (2018). Non-oil Export and Economic Growth in Nigeria: A Time Series Econometric Model. *International Journal of Business Management & Research, 3*(2), 115-124.

Omran, A. Y. A., Gada, M. A., Adel, A. A. M., & Marwa, E. E. A. (2015). Some Economic Determinants of Non-Oil Exports in Sudan: An Empirical Investigation (1990-2012). *Journal of Business Quarterly Studies, 7*(1), 125-150.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics, 16*(3), 289-326.

Phillips, P. C. B., & Hansen, J. (1990). Testing for a Unit Root in Time Series Regression. *Biometrika, 75*(2), 335–346.

Phillips, P. C. B. (1993) Fully Modified Least Squares and Vector Autoregressions. *Cowles Foundation Discussion Paper, 1047,* Retrieved from https://cowles.yale.edu/sites/default/files/files/pub/d10/d1047.pdf

Reisinezhad, A. (2020). The Dutch Disease Revisited: Theory and Evidence. *HAL Open Science, halshs-03012647,* Retrieved from https://halshs.archives-ouvertes.fr/halshs-03012647

Taha, R., Loganathan, N., & Colombage, S. R. N. (2011). The Effect of Economic Growth on Taxation Revenue: The Case of Newly Industrialized Country. *International Review of Business Research Papers, 7*(1), 319-329.

Usman, Z. (2019) The Successes and Failures of Economic Reform in Nigeria's Post-Military Political Settlement. *African Affairs, 119*(474), 1-38.

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