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NATURAL RESOURCES RENTS AND INCOME INEQUALITY IN NIGERIA

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Abstract: **The resource-development nexus has sparked renewed interest in the development literature with growing controversies. As the controversies continue to grow, it becomes imperative to examine the empirical relationship between natural resources rents and income inequality in Nigeria. This study specifically examined how oil rents, natural gas rents and total natural resources rents affect income inequality in Nigeria. The data required for this study were obtained from the World Development Indicators and analyzed using the autoregressive distributed lag method, descriptive statistics and robustness tests. The unit root test showed evidence of levels and first difference stationary processes, which indicates that the variables are fractionally integrated. The bounds test results showed that the variables for investigation are cointegrated. This implies that income inequality has a long run relationship with the underlying measures of natural resources rents during the study period. The findings revealed that, in the long run, all the rents accruable to Nigeria from natural resources contributed significantly in reducing the disparity in income distribution. However, the short run results are mixed. It was evident from the results that the short term effect of total natural resources rents is negative and significant. This indicates that the aggregate rents generated from the natural resources are significant in reducing the gap in the distribution of income. However, rents from oil and natural gas were formed to amplify the disparity in income among the Nigerian population following their significant positive on income inequality. Given the findings, it is recommended that policymakers should move towards addressing the growing incidence and pervasiveness of rent seeking in the management of the revenue from natural resources to reduce the income gap among the population.**

Keywords: **Total resources rents, oil rents, natural gas, income inequality, development and Nigeria.**

1. INTRODUCTION

There is a growing recognition that Nigeria is naturally endowed with various resources which amounts ranging from industrial materials, iron ore, tin-ore, limestone, coal, lead, zinc, marbles, bitumen and tar sand. Statistically, the exploitation of these minerals is very minimal in relation to the level of deposits found in the country. For instance, crude petroleum and gas exploration has expanded throughout the years. It expanded from 1.9 million barrels in 1958 to 152.4 million barrels in 1966. Accessible oil measurements demonstrate that aggregate raw petroleum trades remained at 767.9 million barrels averaging 2.104 million barrels for every day since 1997. Natural gas delivered in relationship with unrefined petroleum summed to 1,142 Billion standard cubic feet, of these 801.8 Billion standard cubic feet (970.21%) was flared, while the remaining was re-infused, utilized as fuel, sold or changed over to Natural Gas Liquids (NGL). The Nigerian gas is the tenth biggest holds in the planet, it involves 30 percent of African gas available (Mordi, Englama & Adebusuyi, 2010; NBS, 2010; NNPC, 2015).

Similarly, limestone deposits in different parts of Nigeria amounts to 3 billion tonnes and 568 million of proven reserve (Osita, 2007). Production of limestone increased from 243,942 tonnes in 1960 to 2.9 million tons in 1999, further to 7.4 million tons in 2004. The production has been influenced by activities of the construction industry especially cement

production. (NBS. 2015, Osita, 2007). In the same vein, Iron Ore deposit in Nigeria stand in excess of about 10 Billion tons which was found in Itakpe, Kogi state. Nigeria is the twelfth wealthiest nation in Iron mineral generation but then imports an expected $3.3 Billion worth of refined steel and related subordinates, delivering 2.8 million metric tons for every annum utilizing 100 percent scrap metal (Mordi, Englama & Adebusuyi, 2010; NBS, 2015). Coal was discovered in large quantities Enugu in 1909, but production has been comparatively low, given a reserve of over 2.7 Billion tons. The peak year of its production was 1958, when nearly 10 million tons was produced. Thereafter it declined persistently to 602,000 tons in 1995 and 2,712 tons in 2000 (Odesola, Samuel & Olugasa, 2013; CBN, 2013).

In addition, Nigeria is also blessed with abundant maritime resources which constitutes about 1.4 percent of the country's total area which provides an abundance of fish of large variety capable of producing about 600,000 metric tons of fish annually and producing less than 12 percent of their estimated fishery potential (Mordi, Englama & Adebusuyi, 2010). However, a large number of studies have shown that resource abundant countries growth was not impressive in terms of macro and socio-economic development when compared to resource poor countries (Sachs & Warner, 1995). The negative relationship between natural resource abundance and a nation's output and prosperity is being referred to resource curse (Auty, 2001). Given, these assumptions, the question now is, can abundant natural resources in Nigeria be crucial for equitable distribution of resources in terms of reducing the growing income gap between the rich and the poor. It is against this backdrop that this study seeks to explore the empirical relationship between natural resources rents and income inequality in Nigeria.

2. LITERATURE REVIEW

2.1 Natural Resource Management (NRM) Value Chain Theory

This theory was popularized by Collier (2007), which provides the pathway for long-term poverty reduction and income redistribution through effective natural resource management. The theory assumes that mitigating the Dutch disease syndrome is inherently a governance challenge: the credibility, quality, transparency, and accountability of policy-making processes, public institutions, the legal and regulatory climate, and sector governance are major determinants of how successfully countries can channel their resource wealth into sustainable development.

Natural resource management spans a great many specific and interrelated decisions on the part of government in interaction with resource developers (private and state-owned) and society. The World Bank has adopted a "value chain approach" to understanding natural resource management with the basic aim of recommending a consolidated set of feasible policy interventions to transform natural resource potential into sustainable development outcomes. The foundation of the theory was designed to systematically assess and identify key political economy dynamics and institutional arrangements with regard to natural resource management in each country in which it was applied and to ensure the diagnostic leverage that comes with consistent methodology (Collier, 2007). They were largely initiated at the request of World Bank country teams grappling with these issues on the ground. Nevertheless, the range of cases in the global study includes countries with both oil and other mineral deposits that are at various stages in terms of both their natural resource extraction and their level of development. They thus illustrate how natural resources and political economies interact in producing outcomes with a view of articulating good-fit, sustainable interventions for resource-dependent developing countries. Natural resources yield 'rents' or extraordinary profits from their production, which are crucial to the political economy of resource-led development. .

From a disaggregated perspective of the NRM value chain, two key issues emerged in characterizing how a government manages its natural resources: These include how effectively does a government generate and capture rents from the extractive industries? And how does the government spend resource wealth and to what extent is it invested in a sustainable and pro-poor programs? In essence, outcomes across the NRM value chain can be reduced to two center rent arenas: generating rents through extraction and taxation and distributing rents through spending and investment. Many different domestic and global partners are involved in natural resource policy making and extraction, and the relationships among these actors are constantly shifting across the value chain.

2.2 Empirical Literature

Employing a meta-analytic review, Sebri and Dachraoui (2021) examined 688 estimates reported by 40 primary studies to quantitatively synthesize the natural resources-income inequality literature. The study showed that there is no evidence of

publication bias or a significant genuine average effect, but the estimates range substantially across studies. The study also employed the multilevel mixed-effects model and shrinkage approaches to determine the driving forces of heterogeneity in the reported estimates. The meta-regression results link this heterogeneity mainly to the measurement of natural resources and income inequality, the specified regression model, the data structure, and the development level of the country on which the study was conducted. The study, therefore, concludes that effective management of resources is helpful for income redistribution.

Hartwell *et al.* (2019) explored how democratic institutions shape the relationship of natural resources and income inequality, under the hypothesis that democracy can help to alleviate the possible effects that resources may have on income inequality. Starting from a survey of the existing literature, the study provided a cross-country regression analysis showing that the effect of natural resources on income inequality does indeed depend on democracy. The study further revealed that, if the level of democracy in a country is high, natural resources have the ability to lower inequality. The study, therefore, recommends that policymakers should improve on democratic institutions to optimize the gains of natural resource abundance for more equal income distribution.

Kim & Lin (2018) empirically investigated the impact of natural resource abundance, in particular oil, on income disparities. The study adopted common correlated effects pooled mean group methodology for estimation to account for the cross-country heterogeneity and cross-section dependence in the oil-inequality nexus. In a sample of developed and developing countries, the study revealed that oil abundance as well as oil dependence reduced income inequality. This inequality-reducing effect is highly likely to operate from better education attainments and improved health status due to oil booms.

Using the system GMM dynamic panel estimation method and data set for the period 1988–2012, Anyanwu, Anyanwu and Cieślik (2021) explored the relationship between inequality and economic growth in resource and non-resource abundant countries. The results revealed that the negative impact of income inequality on economic growth is amplified for countries that are endowed with abundant natural resources. This suggests that resource abundance is a curse to the associated countries. Therefore, the study concludes that reducing income inequality could mitigate the detrimental impact of resource abundance on economic growth.

Berisha *et al.* (2021) investigated the impact of oil resources on income inequality, with a particular focus on distinguishing between the effects from oil abundance versus oil dependency. The study observed contrasting non-monotonic outcomes from oil abundance in comparison to oil dependency. For oil abundance, the study showed that states with low oil production will have less inequality if they increase oil production, and states with high oil production will have increased income inequality if they increase production. The findings suggest several channels of concern which include that oil-rich states are more vulnerable to rent-seeking behaviour as oil production and oil revenues increase, which can adversely affect the income distribution gap. On the other hand, the study revealed that oil-dependent states are more likely to be affected by shocks in commodity prices which can increase income inequality.

Cho (2019) examined the relationship between resource dependence and income inequality across ten Canadian provinces, and a potential role of fiscal transfer and income tax in weakening its relationship. The study utilized provincial-level Gini coefficient to examine the impact of resource dependency in Canada. In addition, the study used three different types of Gini coefficient – based on market income, total income, and after-tax income – to investigate whether fiscal transfer and income tax plays a role in this relationship. The results showed that resource dependence leads to higher market income inequality, while mixed results are shown when fiscal transfer and income taxes are considered suggesting that fiscal transfer and income tax plays a role, albeit limited, in alleviating the effect of resource dependency on income inequality. Given the findings, the study recommended for improved fiscal transfer and income tax to enhance the level of income distribution.

3. METHODOLOGY

3.1 Research Design

In view of the nature of this, an ex post facto research design was employed because the data required for the empirical investigation are already in existence and cannot be manipulated.

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3.2 Model Specification

A dynamic symmetric model, which followed closely the works of Kim & Lin (2018), Berisha *et al.* (2021) and Cho (2019) with some modifications following the expansion of natural resources rents to oil and natural gas rents alongside total natural resources rents. The functional specification of the model is as follows:

INEQ = f(OREN, NGRT, TONRE) (1)

Where: INEQ = Income inequality measured by Gini coefficient

OREN = oil rents (% of GDP)

NGRT = natural gas rents (% of GDP)

TONRE = Total natural resource rent (% of GDP)

The symmetric autoregressive distributed lag (ARDL) model representation of equation (1) is as follows:

$$INEQ_t) = C_0 + \sum_{i=1}^{k} M_1 INEQ_{t-1} + \sum_{i=1}^{k} M_2 ORENT_{t-1} + \sum_{i=1}^{k} M_3 NGRT_{t-1} + \sum_{i=1}^{k} M_4 TONRE)_{t-1} +$$

$$\alpha_1 INEQ_{t-1} + \alpha_2 ORENT_{t-1} + \alpha_3 NGRT_{t-1} + \alpha_4 TONRE_{t-1} + U_t \quad (2)$$

Where: C_0 = Intercept

M_1- M_2 = Short run coefficients

α_1 - α_4 = Long run multipliers

K = notation for the maximum lag

3.3 Estimation Techniques

The ARDL model estimation was employed to explore estimate the dynamic relationship between natural resources rents and income inequality. According to Pesaran and Shin (1999), ARDL is appropriate in handling time series data that are fractionally integrated which are not up to order two. It is equally considered as very flexible given that it incorporates the long and short run coefficients in a single equation set up. Aside from the ARDL, Additionally, the Kwatkowski, Phillip, Schemidt and Shin, (KPSS, 1992) approach to stationarity test was employed for the unit root test. Additionally, descriptive statistics such as mean, standard deviation and Jarque-Bera statistic were employed for analyzing the distribution of the variables over the study period.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The descriptive statistics are summarized as in Table 1.

Table 1: Summary of the descriptive statistics

	OREN	NGRT	T0NRE	INEQ
Mean	11.71850	0.502400	14.34650	44.57925
Median	10.50000	0.420000	13.28000	44.75000
Maximum	26.43000	1.670000	31.81000	56.00000
Minimum	1.510000	0.000000	2.520000	36.70000
Std. Dev.	5.896977	0.505635	6.576410	5.038423
Jarque-Bera	0.909015	4.103126	0.761419	2.066516
Probability	0.634760	0.128534	0.683376	0.355846
Observations	40	40	40	40

Source: Computed by the author using E-views

The descriptive statistics for the variables show that oil rent and natural gas rent averaged 11.72 and 0.502 per cent respectively. Similarly, the average values of total natural resources rents and income inequality are 14.35 per cent and 44.57 per cent respectively. In addition, income inequality, measured by the Gini coefficient ranged between the minimum value of 36.7 per cent and maximum value of 56 per cent, which indicates that there is growing gap in the distribution of income among the population. The standard deviations showed that the observations for all the variables clustered around the mean values, which indicate that they not to vary over the study period. Additionally, the probability values of the Jarque-Bera statistics are greater than 0.05, which show evidence of normal distribution in all the variables over the study period.

4.2 Unit Root Tests

The results of the unit root test conducted using the KPSS method is reported in Table 2.

Table 2: KPSS unit root test results

Null hypothesis: Variable is stationary					
Variable	Levels test results		First difference test results		Order of Integration
	LM statistic	5 Percent Critical value	LM statistic	5 Percent Critical value	
INEQ	0.2260	0.463	NA	0.463	I(0)
OIL	0.162	0.463	NA	0.463	I(0)
GAS	0.671	0.463	0.189	0.463	I(1)
TONRE	0.1742	0.463	NA	0.463	I(0)

Source: Computed by the author using E-views

Note: NA denotes not available due to evidence of stationarity at the levels test result.

As observed from the results of the KPSS unit root tests, all the variables with except natural gas rents are stationary at levels. Consequently, the hypothesis of stationary process in these variables cannot be rejected. However, natural gas rent was found to be stationary at first difference. With the evidence of levels and first difference stationary processes, the variables are considered to be fractionally integrated. While natural gas rent is integrated of order one [I(1)], the other variables in the model are integrated of order zero [I(0)]. These findings made it imperative for the choice of the bounds cointegration method to check for the evidence of long run relationship among the variables.

4.3 Bounds cointegration Test

The ARDL bounds cointegration test result which was performed at 5 per cent is presented in Table 3.

Table 3: Bounds cointegration test result

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	6.398	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Computed by the author using E-views

Note: K denotes number of explanatory variables in the model

The bounds cointegration test results showed that the computed F-statistic (6.398) is greater than the upper bound critical value (4.3) at 5 per cent level. This finding indicates that the variables for investigation have a long run relationship. Consequently, this provides the basis for rejecting the null hypothesis of no long run relationship among the variables. This implies that income inequality has a long run relationship with the underlying measures of natural resources rents during the study period. This result is agreement with the findings of some previous studies such as Anyanwu, Anyanwu

and Cieślik (2021) and Berisha *et al.* (2021) among others. Given the findings, the ARDL estimation method is considered appropriate for capturing the long and short run relationship among the variables over the study period.

4.4 ARDL Model Estimation

The estimated ARDL model which shows the empirical long and short run relationship between income inequality and natural resources rents are presented in Table 4.

Table 4: ARDL long and short run estimates

Dependent Variable: INEQ				
Selected Model: ARDL(2, 2, 0, 2)				
Short run form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INEQ(-1))	0.613449	0.109402	5.607265	0.0000
D(OREN)	0.181318	0.404762	0.447962	0.6576
D(OREN(-1))	0.907098	0.449736	2.016954	0.0534
D(NGRT)	0.936000	0.451669	2.072313	0.0476
D(T0NRE)	-0.156330	0.390115	-0.400728	0.6917
D(T0NRE(-1))	-0.877443	0.433795	-2.022714	0.0527
CointEq(-1)	-0.330375	0.063458	-5.206243	0.0000
Long run coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
OREN	-5.141102	0.973863	-5.279079	0.0000
NGRT	-2.833143	1.272426	-2.226568	0.0342
T0NRE	-4.732019	0.850519	-5.563686	0.0000
C	35.787199	2.163944	16.537953	0.0000

Source: Computed by the author using E-views

As observed from the short run result, one period lag of oil rents has a significant positive effect on income inequality in the short run. This finding corroborates with the results of Berisha *et al.* (2021), which showed that oil-rich states are vulnerable to disparity in the distribution of income. This further explained the growing incidence of rent-seeking which has characterized the activities of the oil sector in Nigeria with adverse implication on the income distribution gap. At the same time, the short term effect of natural gas rents on income inequality is positive and significant at 5 per cent level. This finding indicates the poor management of the gas resources for economic development in Nigeria. On the other hand, the short term effect of total natural resources rents is negative and significant. This indicates that the aggregate rents generated from the natural resources are significant in reducing the gap in the distribution of income. In addition, the long run results revealed that oil and natural gas rents as well as total natural resources rents have significant negative effects on income inequality. The finding showed that the long term negative effect oil resources rents is stronger compared to other natural resources, which is tacit with work of Kim & Lin (2018) that oil abundance as well as oil dependence reduced income inequality. The error correction coefficient (-0.330) has the expected negative sign and it is highly significant. This implies that the model can adjusts to long run equilibrium position at a speed of 33 per cent. It finding further corroborates the evidence of long run relationship between income inequality and natural resources rents over the study period.

5. CONCLUDING REMARKS

Mitigating the growing disparity in income distribution has remained to successive governments in Nigeria despite the abundance of natural resources in the country. Thus, this study explored the empirical relationship between natural resources rents and income inequality in Nigeria with a focus on oil rents, natural gas rents and total natural resources rents. The findings revealed that, in the long run, all the rents accruable to Nigeria from natural resources contributed significantly in reducing the disparity in income distribution. However, the short run results revealed that only total resources rents play a substantial role in reducing the gap in the distribution of income whereas rents from oil and natural gas were formed to amplify the disparity in income among the Nigerian population following their significant positive on income inequality. Thus, it is concluded, on balance, that the potentials of natural resources in reducing the disparity in

income tends to manifest in the long run. To this end, this study recommended that policymakers should move towards addressing the growing incidence and pervasiveness of rent seeking in the management of the revenue from natural resources. This will create more opportunities for equitable resources redistribution to reduce the income gap among the population.

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