Received: 27 October 2022 | Revised: 8 March 2023 | Accepted: 13 March 2023 | Published online: 15 March 2023

RESEARCH ARTICLE

Green and Low-Carbon Economy
2023, Vol. 00(00) 1–7
DOI: 10.47852/bonviewGLCE3202485

BON VIEW PUBLISHING

Resource Curse in WAIFEM Member Countries: An Application of Seemingly Unrelated Regression

Nasiru Inuwa* , **Maryam Bello** and **Mohammed Bello Sani**

Gombe State University, Nigeria

Abstract: Even though empirical evidence has shown that naturally endowed countries grow slower than their less naturally endowed counterparts, the scenario tagged as "resource curse hypothesis," but it seems there are exceptions. Therefore, this study examines the confirmation or disputation of resource curse hypothesis among the West African Institutes for Financial and Economic Management member countries during the period 1986–2016. The study applied seemingly unrelated regression and unraveled the strengthened effect of natural resources on output growth in Gambia, Ghana, and Sierra Leone. But, the study revealed a negative and statistically significant effect on economic growth in Liberia and Nigeria, thereby upholding the presence of resource curse hypothesis only in Liberia and Nigeria. Therefore, an overall "umbrella" policy recommendation inappropriate, but individually designed strategy that would help in managing the resource rents effectively in order to boost economic growth particularly in Liberia and Nigeria where their resource endowment serves as a curse rather than a blessing is recommended.

Keywords: resource curse, economic growth, natural resources, SUR, WAIFEM

1. Introduction

The role of natural resources in the growth and development of many nations has been at central axis of development theory and practice. Coincidently, a substantial number of developing countries have been endowed with different types of natural resources such as oil, natural gas, and other mineral resources. While judicious use of such resources might offer an opportunity to resource-abundant countries to transform their economies, only a handful of them were able to convert such endowments into sustained and meaningful growth [1].

Africa is generously endowed with not only renewable but also nonrenewable resources, and conventional economic theory posits that natural resources strengthened economic growth. Interestingly, some empirical studies have justified that, particularly Brunnschweiler [2], Fan et al. [3], and Wu et al. [4]. However, their findings to a larger extent have been challenged following the earlier studies of Sachs & Warner [5], Papyrakis & Gerlagh [6], Boschini et al. [7], Daniele [8], Behbudi et al. [9], Eregha & Mesagan [10], and Amini [11] where detrimental effects of natural resources on economic growth were evidenced. This finding is tagged as "resource curse" in the natural resource economics literature.

But a critical review of previous studies revealed many shortcomings. For instance, most of these studies [5, 12–15] were based on a cross-sectional modeling using ordinary least square (OLS) methods, and their conclusions were highly unreliable and have been criticized based on different econometric problems. This is not farfetched as convincingly argued by Wijesekere [16] that findings of studies modeled from the lens of cross-sectional framework are sensitive to number of samples chosen and wrongly treat different economic entities as homogeneous. Similarly, applying instrumental variables does not seem to have solved the problems especially when the long periods of data have been averaged. As for time series modeling, the solutions to the problems are yet to be obtained because larger observations are a prerequisite for robust econometric analysis, thereby restricting their analysis to a fewer number of countries where the data availability is another source of concern.

Attempt to solve the problems identified with both cross-sectional and time series analysis led to introduction of panel data which combine the two modeling frameworks and offer a variety of estimation techniques such as static and dynamic panel techniques as well as panel cointegration tests. However, conventional fixed-effect and random-effect models produce biased and inconsistent estimates in the presence of endogeneity problem. Equally identified as a shortcoming is not only the inability to capture the dynamic nature of most growth models but also the homogeneity imposed across countries even when they differed at their developmental stages [17].

Another point worth noting is the requirement of large numbers of cross-sections over time periods for the application of both difference and system generalized method of moments (GMM). Thus, failure to satisfy this condition might likely produce spurious results emanating from the number of instruments that will become larger and consequently affects the validity of Sargan test of over identify restrictions. Therefore, this study addressed

*Corresponding author: Nasiru Inuwa, Gombe State University, Nigeria. Email: ninuwagsu@gmail.com

the aforementioned limitations by deploying seemingly unrelated regression (SUR) estimation proposed by Zellner [15] to examine the confirmation or disputation of resource curse hypothesis among the West African Institutes for Financial and Economic Management (WAIFEM) member countries. The selection of WAIFEM member countries is justified because most of the countries have been identified with different types of natural resources. For instance, Nigeria and Ghana have been endowed with oil and gas, while Liberia and Sierra Leone with iron ore, respectively [18]. Although economic growth can be strengthened with abundant natural resources as priorily expected, but findings from the recent empirical studies are yet to be conclusive.

The premise for the application of SUR relies on its ability to estimate all the equations and obtain the coefficients of the parameters concurrently, thereby accommodating the cross-sectional dependence among the countries [19]. Similarly, the panel aspect of data will not pose any challenge since the cross-section is small and the time dimension is considerably large as explained by Breitung & Peseran [20]. The techniques also produce efficient estimates in the presence of heteroskedasticity.

The remaining parts of the study are configured into the following sections, while the relevant related studies are reviewed in Section 2; Section 3 is devoted to explanation of the data and model used in the study. Section 4 focuses on empirical results alongside its discussion, and finally, the conclusion section concludes the study.

2. Literature Review

The celebrated resource curse hypothesis opined that countries much endowed with natural resources tend to grow slowly compared to their less resource-endowed counterparts. Though, many empirical studies justified that, but there seem to be some exceptions especially where different proxies are used for natural resource abundance and dependence, nature of data used, number of countries included in the analysis as well as methodology employed. Therefore, reviewed studies are grouped based on confirmation or disputation of resource curse hypothesis as well as mixed results.

Path-breaking work by Sachs & Warner [5] led the way for many studies to uphold the outcome that natural resources retards output expansion in resource-rich countries. For instance, Ilmi [21] studied the question of whether natural resources could accelerate growth for 89 countries during the period 1998–2002. The study utilized OLS and documented that natural resources showed a detrimental effect on economic growth. Also, when the natural resource abundance interacted with governance stimulated economic growth. However, the governance variable insignificantly influences economic growth. Similarly, the extent to which natural resource affects economic growth in 49 United States (US) states is studied by Papyrakis & Gerlagh [6] with the aid of OLS and two-stage least squares (2SLS) regression methods. The outcome evidenced that natural resource abundance had a detrimental effect on output expansion.

In a similar but larger sample of 87 countries, Boschini et al. [7] unraveled the extent to which economic growth can be strengthened by natural resources. The study utilized an OLS and 2SLS regression analysis and demonstrated that natural resources adversely affect economic growth. However, the institutional variable has been found to have strengthened economic growth. Similarly, when natural resources interacted with institutions, the study documented a positive influence on output expansion. The study therefore suggests that countries under study need to do more in getting their institutions right so that their institutions can help the resources abundance into an asset rather than a curse. Similarly, Boyce & Emery [22] unraveled how natural resources boosted economic growth for 50 US states with the aid of static panel techniques demonstrated an adverse effect of resource abundance on economic growth.

Daniele [8] examined the effect how natural resources influence economic growth in a cross-section of countries during the period 1980–1990. The study applied OLS and 2SLS and demonstrated that natural resource endowment detrimentally influences output expansion. The study however showed that sound and qualitative institutions stimulated economic growth. Jalloh [23] studied the nexus between natural resource abundance and output expansion for West African countries. The author deployed statics panel techniques and two-step GMM. The outcome showed that natural resources retarded output expansion. Finally, the outcome justified that corruption discourages output expansion.

A comprehensive study by Amini [11] focuses on how natural resources affect output expansion for 83 countries spanning from 1996 to 2010. The study applied pooled OLS, fixed-effect, and random-effect. The results revealed that natural resource endowment and sound institutional quality had not only a positive but also insignificant influence on output expansion in advanced countries. While, the resource curse hypothesis was upheld in both underdeveloped and developing countries, however, institutional quality has been found to have insignificantly stimulated output expansion. A more recent study of top-ten African resource-endowed countries; Inuwa et al. [24] deployed newly developed GMM and showed that natural resources retard economic growth. However, human capital and institutional quality stimulate economic growth.

In another country-specific study of Pakistan, Yasmeen et al. [25] utilized a structural equation modeling to study the influence of natural resource alongside other control variables on output expansion. The outcome showed a detrimental effect of natural resources on economic growth. However, the outcomes demonstrated that renewable, nonrenewable energy consumption, and financial openness stimulated economic growth in Pakistan. Studying the aggregated and disaggregated effect of natural resources on economic development in G-7 countries via the deployment of the recent quantile via moments documented a detrimental effect of both aggregated and disaggregated natural resources on economic development.

Unlike the findings of the study of Sachs & Warner [5], other strands of studies discovered that natural resources endowment stimulated output expansion as a priorily posited. For instance, Brunnschweiler [2] examined how natural resource and institutional quality influence economic growth via the application of OLS and 2SLS techniques and documented that natural resources and institutional quality stimulate output expansion, thereby disputing the resource curse hypothesis. Furthermore, Fan et al. [3] unraveled the role of natural resources in stimulating economic growth for 26 Chinese provinces spanning from 1997 to 2005 via the application of the OLS technique. The results established that there is no significant evidence justifying the resource curse hypothesis in China. Specifically, the outcome established that endowment in natural resources in a city showed a diffusional influence on economic growth.

Furthermore, Chambers & Guo [26] used 93 countries to unravel the influence of natural resources on output expansion for an unbalanced panel of 93 countries. The study deployed a two-step system GMM and documented that initial income from natural resources significantly boosted output expansion. The study therefore concluded that countries under study should not

rely heavily on environmentally-intensive economic growth strategies. More so, Ouoba [27] examined how resource funds stimulated economic growth for 28 resource-rich countries covering the period 1985–2010. The study deployed Driscoll-Kraay technique and system GMM and showed that the more countries depend on natural resources, more it retards their growth. However, when natural resource is proxied by resource funds, the outcome discovered a detrimental influence on growth. Using a relatively recent methodology of mean group (MG) and augmented mean group (AMG), Al-Mamun et al. [28] investigated how both natural resource and governance variables can determine output expansion in 50 oil-exporting economies and the outcome disclose that oil-rent per capita and sound institutions boost output expansion. In another recent study with a novel methodology, Inuwa et al. [29] re-examined how natural resources impacted economic growth in Organization of Petroleum Exporting Countries (OPEC) member countries spanning from 2008 to 2018 via the application of the recently developed GMM of Kripfganz [30]. The study justified the existence of the natural resource curse hypothesis. But, the study discovered that financial sector development and institutional quality stimulate economic growth.

Hassan et al. [31] deployed the conventional autoregressive distributed lag (ARDL) model to find out the influence of natural resources and globalization on economic growth in Pakistan and demonstrated a strengthened influence of natural resource and globalization on economic growth. Kwakwa et al. [32] studied the extent to which aggregate and disaggregate natural resources affect economic growth in Tunisia and unraveled a strengthened effect of natural resources on economic growth. Similarly, democracy, oil, mineral, and forest rents stimulate economic growth. In another recent but multi-country study, Usman et al. [33] deployed second-generation panel methodologies for eight Arctic countries and concluded that natural resources, globalization, financial development, renewable and nonrenewable energy consumption spur economic growth.

The last category of studies documented a mixed finding by showing natural resources as both a blessing and a curse. For example, Mehrara [34] studied the influence of oil revenue on economic growth of 13 oil-exporting economies taking into cognizance inter-country and inter-temporal variation spanning the period 1965–2005. The study applied generalized least squares (GLS) with the aid of a spline technique which allows relationships to have a turning point. The results of the linear model revealed that oil revenue influenced economic growth only when the threshold taking is below 18%. But when the threshold taking was around 18–19%, the results displayed a significant and detrimental effect on output expansion. Moreover, Gerelmaa & Kotani [35] examined how natural resource influences economic growth in 182 countries structuring the sample into two periods (1970–1990 and 1990–2010); the study applied quintile regression technique and displayed a deteriorating effect of natural resources on economic growth for the period 1970–1990. However, from 1990 to 2010 the study unraveled a significant effect of natural resources on economic growth.

Focusing on the 11 Middle East and North Africa (MENA) countries, Apergis & Payne [36] unravel how oil abundance and sound institution stimulate economic growth via the deployment of time-varying cointegration test and evidenced an adverse influence of oil abundance on economic growth prior to 2003, but started to exert positive impact on growth up to 2013. But, institutional quality showed a significant and retarding influence on economic growth. In another study of 29 major petroleum exporting countries, Behbudi et al. [9] unraveled how natural resource influences economic growth taking human capital as a control variable. The study deployed static panel regressions and demonstrated the devastating effect of natural resources on output expansion. Similarly, the coefficient of human capital has been established to have a deteriorating influence on economic growth.

Eregha & Mesagan [10] studied how natural resources when controlled for institutional quality stimulate economic growth for 5 selected oil-rich African countries via the application of static panel techniques, and the outcome established that net oil per capita and oil export have deteriorated economic growth. But, the study evidenced that institutional quality insignificantly stimulates economic growth. Similarly, oil production has been found to have strengthened economic growth. Considering 30 Provinces in China, Wu et al. [4] investigated the disaggregated influence of natural resources on economic growth for 30 during the period 1997–2015 via the application of static panels in the form of pooled OLS, fixed-effect, and random-effect. The outcome unraveled a significant influence of natural resources on economic growth. The study however showed that natural resource-oriented industries insignificantly retard output expansion.

To study a disaggregated influence of natural resource on output expansion in Nigeria covering from 1981 to 2017, Inuwa et al. [37] deployed Bayern and Hanck test and disclosed that both oil and forest rents retarded output expansion in Nigeria. However, the study established a strengthened effect of natural gas, coal, and mineral rents on economic growth. Inuwa et al. [19] studied the effect of natural resources on economic growth in Gulf Corporation Council (GCC) countries and unraveled a positive impact of oil and natural gas rents on economic growth in United Arab Emirate and Kuwait, Bahrain, and Qatar, respectively. However, oil rents retard output growth in Qatar, Bahrain, and Saudi Arabia. Also, disaggregating the natural resources into dependence and abundance in 5 West African countries in 1990–2020 by using the recent methods of moment quantile regressions, Inuwa et al. [38] demonstrated that countries dependent on natural resources retarded output expansion in all quantiles. However, abundance, natural resource insignificantly boosts output growth in all quantiles.

3. Data and Model

3.1. Data

To unravel the presence or absence of resource curse hypothesis among the 5 selected countries (Nigeria, Gambia, Liberia, Sierra Leone, and Ghana), data covering the period 1986–2016 on GDP per capita (GDP) and total natural resources rents (NRR) were sourced from the World Development Indicators, respectively. The logarithmatic transformed GDP per capita is measured in constant 2010 US$ as a proxy for economic growth and the logarithmatic transformed total natural resource rents measured as the percentage of a country's GDP that stands for natural resources.

3.2. Methodology

SUR proposed by Zellner [15] is applied to estimate a system of equations that are seemingly unrelated but are actually related by the fact that their error terms are correlated. This is easily achieved since the unobserved factors linked in the different equations' errors can be estimated simultaneously taking into cognizance contemporaneous correlation and heteroskedasticity [39, 40]. Therefore, the system of equations is expressed as follows;

$$LGDP_i = LNRR_i\beta_i + \mu_i \quad i = 1, 2, 3 - - - -, N \tag{1}$$

where LGDP denotes logarithm of GDP per capita for country i and LNAR denotes logarithm of natural resources at country i and finally β_i are coefficients to be estimated and μ_i are the error terms. This approach is based on generalized least square (GLS) and is further specified using matrix as;

$$\begin{bmatrix} LGDPG \\ LGDPGA \\ LGDPL \\ LGDPN \\ LGDPS \end{bmatrix} = \begin{pmatrix} LNRRG & 0 & 0 & 0 & 0 \\ 0 & LNRRGA & 0 & 0 & 0 \\ 0 & 0 & LNRRL & 0 & 0 \\ 0 & 0 & 0 & LNRRN & 0 \\ 0 & 0 & 0 & 0 & LNRRS \end{pmatrix} \times \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \\ \beta_5 \end{pmatrix} + \begin{pmatrix} \mu_G \\ \mu_{GA} \\ \mu_L \\ \mu_N \\ \mu_S \end{pmatrix}$$

where $LGDP_i$ and μ_i are $n \times 1$ vectors; β_i is a $p_i \times 1$ vector; $LNRR_i$ is a $n \times p_i$ matrix; $LGDP$ and μ are $5n \times 1$ vectors; and β is a $(p_1 + p_2 + p_3 + p_4 + p_5) \times 1$ vector; $LNRR$ is a $5n \times (p_1 + p_2 + p_3 + p_4 + p_5)$ matrix [41]. Therefore, the mean of the error term must be equal to zero $\{E(\mu_i/LNRR_i) = 0\}$ and follow variance-covariance matrix of errors $\{\Omega = E(\mu\mu') = \sum \otimes I_N\}$. The permissibility of estimating multiple equations concurrently while taking into consideration unobservable country-specific correlations justifies the application of SUR technique. Also, the point worth noting is the ability of the model to provide unbiased and efficient estimates.

4. Empirical Results

In order to achieve the objective of this study, this section focuses on the empirical results of the study. Thus, the study tested unit root of the variables with a view to unravel the degree of integration and stationarity properties of the explained and explanatory variables, the Phillips-Perron (PP) unit root test was conducted, and the outcomes are presented in Table 1 below.

Table 1 presents the outcomes of Phillip-Perron tests for all the variables, and the outcome established that variables at their level values are not stationary. This suggests that the null hypothesis of the variable containing a unit root is accepted. However, all the variables turned to stationary after taking their first difference at either 1% or 5%, respectively. Thus, the same order (i.e. I(1)) of integration of all the used variables is established.

OLS is efficient in estimating equation by equation when there is absence of contemporaneous correlation between the errors among different equations. Table 2 presents the outcomes of the correlation matrix of residuals. Based on the outcomes, the hypothesis that the correlation among the five equations is zero can be rejected and concluded that the model is well and better fit with SUR method than estimation with OLS for each equation using simple linear regression model.

After confirming the possible unobservable effect from one country to another in the panel based on the outcome of Breusch-Pagan test of independence, the study deployed the SUR method, and the outcomes are presented in Table 3. The outcome

Table 1
Results of Phillips-Perron unit root test

Variable	PP-Test at Level Value	PP-Test at First Difference	Order of Integration
LGDPG	−2.448	−6.769***	I(1)
LGDPGA	1.625	−2.996**	I(1)
LGDPL	−2.364	−3.099**	I(1)
LGDPN	−0.002	−5.235***	I(1)
LGDPS	−1.361	−5.479***	I(1)
LNRRG	−0.570	−5.989***	I(1)
LNRRGA	−1.860	−6.271***	I(1)
LNRRL	−2.379	−4.911***	I(1)
LNRRN	0.259	−5.403***	I(1)
LNRRS	−2.900	−5.823***	I(1)

Notes: *** and ** indicate 1% and 5% significance level, respectively.

Table 2
Results of the correlation matrix of residuals

	LGDPG	LGDPGA	LGDPL	LGDPN	LGDPN
LGDPG	1.0000				
LGDPGA	0.3077	1.0000			
LGDOL	−0.0847	0.2743	1.0000		
LGDPN	0.1867	0.2958	−0.0792	1.0000	
LGDPS	0.1117	0.5535	0.5539	0.3846	1.0000

Breusch-Pagan test of independence: $\chi^2 = 33.456$, $Pr = 0.0002$***, ***indicate level of significance level at 1%.

demonstrated that natural resources positively stimulated output expansion in Gambia, Ghana, and Sierra Leone. This implies that 1 percent in natural resources boosts output growth to rise by 0.03, 0.46, and 0.16 percent in Gambia, Ghana, and Sierra Leone, respectively. Therefore, the effect of natural resources on economic growth in Gambia, Ghana, and Sierra Leone justifies the *a priori* expectation that a natural resource stimulates economic growth. This finding corroborated that of Brunnschweiler [2], Chambers & Guo [26], Hassan et al. [31], Al-mamun et al. [28], Kwakwa et al. [32], and Usman et al. [33]. However, in the cases of Liberia and Nigeria, their results revealed that natural resources have detrimentally affected output growth. Thus, a 1% surge in natural resources deterred output growth by 0.28% and 0.97%, respectively. This outcome is in support of Daniele [8], Boyce & Emery [22], Jalloh [23], Amini [11], and Inuwa et al. [37]. Therefore, their results confirm the resource curse hypothesis that the more a country is naturally resource-endowed, the less it grows. Moreover, all the *F*-statistics values are higher than the p-values suggesting a good overall significance of the estimated models for all the countries under study.

The robustness test of the results has been displayed in Table 4. Based on the outcome presented, natural resources significantly retarded economic growth in Sierra Leone, Nigeria, and Gambia. This suggests that a 5%, 10%, and 5% rise in natural resources will retard economic growth in Gambia, Nigeria, and Sierra Leone by 0.06%, 0.22%, and 0.37%, respectively. However, the outcomes demonstrated a negative but insignificant effect of natural resources on output expansion in Ghana and Liberia, though the outcomes of OLS showed different coefficients from that of SUR. But, this is not unexpected because of the inability of the OLS to compute all the equations concurrently with efficiency. Similarly, the inherent ability of the SUR to

Table 3
Results of seemingly unrelated regression

Countries	Variables	Coefficient
GAMBIA	Constant	6.220428
		(0.014)
	LNRRG	0.0257835***
		(0.001)
	R^2	0.26
	F-Statistics	7.12 [0.008]
GHANA	Constant	5.893025
		(0.110)
	LNRRGA	0.4610786***
		(0.050)
	R^2	0.68
	F-Statistics	83.96 [0.000]
LIBERIA	Constant	9.424294
		(0.429)
	LNRRL	−0.9739906***
		(0.115)
	R^2	0.63
	F-Statistics	71.82 [0.000]
NIGERIA	Constant	8.277238
		(0.167)
	LNRRN	−0.2762144***
		(0.051)
	R^2	0.52
	F-Statistics	29.48 [0.000]
SIERRA LEONE	Constant	5.515976
		(0.141)
	LNRRS	0.157162***
		(0.052)
	R^2	0.24
	F-Statistics	9.10 [0.003]

Source: ***indicates level of significance at 1%, Figures in [ ] and () are *P*-values and standard errors, respectively.

Table 4
Results of ordinary least squares

Countries	Variable	Coefficients
GAMBIA	Constant	6.761587
		(0.0000)***
	LNARRG	−0.062376
		(0.0119)**
GHANA	Constant	7.098874
		(0.0000)***
	LNARRGA	−0.002761
		(0.8916)
LIBERIA	Constant	6.308666
		(0.0000)***
	LNARRL	−0.014887
		(0.9330)
NIGERIA	Constant	8.126589
		(0.0000)***
	LNARRN	−0.225628
		(0.0715)*
SIERRA LEONE	Constant	6.811809
		(0.0000)***
	LNARRS	−0.365946
		(0.0285)**

accommodate cross-sectional dependency among the countries might have been one of the reasons.

5. Conclusion

Most of the African countries have been endowed with one form of natural resources or the other, but this endowment has not been established in their growth trajectory; hence, this study is set to unravel the extent to which natural resources stimulate output growth among WAIFEM countries spanning the period 1986–2016. The study applied the SUR method, and the outcome established that natural resources play a critical role in stimulating economic growth in Gambia, Ghana, and Sierra Leone. However, the study unraveled a detrimental effect of natural resources on economic growth in Liberia and Nigeria. The policy implication of the findings suggests that natural resources when managed sustainably will stimulate output growth of the rents accrued to the endowed countries via the formulation and application of the appropriate policies capable of turning the curse of natural resources into blessings. Similarly, policymakers among the countries should formulate policies that would ensure the effective and efficient use of rents generated from natural resources as well as significant improvement in both manufacturing and labor markets which will in turn stimulate not only inclusive but also sustainable economic growth. Thus, the findings of both "positive" and "negative" effect of natural resources endowment on economic growth among the studied countries would make an overall "umbrella" policy recommendation to WAIFEM member countries inappropriate, but individually designed strategies that would help in managing the resources rents effectively in order to stimulate economic growth particularly in Liberia and Nigeria where their resource endowment serves as a curse rather than blessings as established in this study. The outcomes of this study are limited for the fact that it unraveled only the conditional mean influence of natural resources on output growth. Therefore, further studies will be required to examine all the conditional distribution effects of explanatory variables on explained variable via the deployment of the recent and novel method of moment quantile regression. Similarly, capturing governance and institutional variables by future studies will also go a long way in providing the actual picture of the presence or absence of a resource curse.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

References

[1] Thorborg, N., & Blomqvist, M. (2015). Natural resource watch: report on sub-Saharan Africa. IBIS Education and Development. www.ibis-global.org.

[2] Brunnschweiler, C. N. (2008). Cursing the blessing? Natural resource abundance, institutions, and economic growth. *World Development*, *36*, 399–419.

[3] Fan, R., Fang, Y., & Park, S. Y. (2012). Resource abundance and economic growth in China. *China Economic Review*, *23*, 704–719.

[4] Wu, S., Li, L., & Li, S. (2018). Natural resource abundance, natural resource-oriented industry dependence and economic growth: Evidence from the provincial level in China. *Resources, Conservation & Recycling*, *139*, 163–171.

[5] Sachs, J., & Warner, A. M. (1995). Natural Resources Abundance and economic growth. National bureau for Economic Research. NBER, (Working Paper 5398).
[6] Papyrakis, E., & Gerlagh, R. (2007). "Resource Abundance and Economic Growth in the United States." *European Economic Review*, *51*, 1011–1039.
[7] Boschini, A. D., Petterson, J., & Roine, J. (2007). Resource curse or not: A question of appropraibility. *Scandinavian Journal of Economics*, *109*, 593–617.
[8] Daniele, V. (2011). Natural resources and economic growth: A curse or a blessing. *Revista Intaliana Degli Economisti XV1*, 507–528.
[9] Behbudi, D., Mamipour, S., & Karami, A. (2010). Natural resource abundance, human capital and economic growth in the petroleum exporting countries. *Journal of Economic Development*, *35*, 81–102.
[10] Eregha, P. B., & Mesagan, E. P. (2016). Oil resource abundance, institutions and growth: evidence from oil producing African countries. *Journal of Policy Modelling*, *38*, 603–619.
[11] Amini, A. (2018). Studying the effect of abundance of natural resources on economic growth. *European Journal of Sustainable Development*, *7*, 201–208.
[12] Atkinson, G., & Hamilton, K. (2003). Savings, growth and the resource curse hypothesis. *World Development*, *31*, 1793–1807.
[13] Gylfason, T. (2001). Natural resources, education, and economic development. *European Economic Review*, *45*, 847–859.
[14] Gylfason, T. (2002). Mother earth: Ally or adversary. *World Economics*, January, 1–19.
[15] Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. *Journal of the American Statistical Association*, *57*, 348–368.
[16] Wijesekere W. (2009) The role of household panel surveys in evidence-based policy. In *A Revised Version of the Paper Presented to the Australasian Evaluation Society International Evaluation Conference*, 2009, 31 August–4 September 2009, Canberra Australian Capital Territory.
[17] Samargandi, N., Fidrmuc, J., & Ghosh, S. (2014). Is the relationship between financial development and economic growth monotonic? Evidence from a sample of middle income countries. CESIFO Working Paper No. 4743, Category 6: Fiscal Policy, Macroeconomics and Growth.
[18] Natural Resource Governance Institutes (2019) Resource governance index: From legal reform to implementation in Sub-Saharan Africa. www.resourcegovernance.org.
[19] Inuwa, N., Adamu, S., Sani, M. B., & Saidu, A. M. (2022b). Resource curse hypothesis in GCC member countries: Evidence from seemingly unrelated regression. *Biophysical Economics and Sustainability*, *7*, 13. https://doi.org/10.1007/s41247-022-00108-y.
[20] Breitung, J., & Peseran, M. H. (2005). Unit roots and cointegration in panels. CESIFO Working Paper Number 1565, Category 10: Empirical and Theoretical Methods.
[21] Ilmi, A. (2007). Escaping from the resource curse: Evidence from Botswana and the rest of the world. *IMF Staff Papers*, *54*, 663–699.
[22] Boyce, J. R., & Emery, J. C. H. (2011). Is a negative correlation between resource abundance and growth sufficient that there is a "resource curse"?. *Resources Policy*, *36*, 1–13.
[23] Jalloh, M. (2013). Natural resources endowment and economic growth: The West African experience. *Journal of Natural Resources and Development, 6*, 66–84.
[24] Inuwa, N., Sani, M. B., Adamu, S., Modibbo, H. U., & Saidu, A. M. (2022c). Testing the resource curse hypothesis: evidence from top ten resource-rich countries in Africa. *African Journal of Business and Economic Research, 17*(2), 205.
[25] Yasmeen, H., Tan, Q., Zameer, H., Vo, X. V., & Shahbaz, M. (2021). Discovering the relationship between natural resources, energy consumption, gross capital formation with economic growth: can lower financial openness change the curse into blessing. *Resources Policy*, *71*, 102013. https://doi.org/10.1016/j.resourpol.2021.102013.
[26] Chambers, D., & Guo, J. (2009). Natural resources and economic growth: Some theory and evidence. *Annals of Economics and Finance*, *10*, 367–389.
[27] Ouoba, Y. (2016). Natural resources: Funds and economic performance of resources-rich countries. *Resources Policy*, *50*, 108–116.
[28] Al-Mamun, M., Sohag, K., & Hassan, M. K. (2017). Governence, resources and growth. *Economic Modelling*, *63*, 238–261.
[29] Inuwa, N., Modibbo, H. U., Adamu, S., & Sani, M. B. (2021). Resource curse hypothesis: fresh evidence from OPEC member countries. *OPEC Energy Review, 45*(4), 462–474.
[30] Kripfganz, S. (2019). Generalized method of moments estimation of linear dynamic panel data models. London Stata Conference, pp. 1–128.
[31] Hassan, S. T., Xia, E., Huang, J., Khan, N. H., & Iqbal, K. (2019). Natural resources, globalization, and economic growth: Evidence from Pakistan. *Environmental Science and Pollution Research*, *26*, 15527–15534. https://doi.org/10.1007/s11356-019-04890-z.
[32] Kwakwa, P. A., Adzawla, W., Alhassan, H., & Achaamah, A. (2022). Natural resources and economic growth: does political regime matter for Tunisia? *Journal of Public Affairs*, *22*, e2707. https://doi.org/10.1002/pa.2707.
[33] Usman, M., Jahanger, A., Makhdum, M. S. A., Balsalobre-Lorente, D., & Bashir, A. (2022). How do financial development, energy consumption, natural resources, and globalization affect Arctic countries' economic growth and environmental quality? An advanced panel data simulation. *Energy*, *241*, 122515. https://doi.org/10.1016/j.energy.2021.122515.
[34] Mehrara, M. (2009). Reconsidering the resource curse in oil-exporting countries. *Energy Policy*, *37*, 1165–1169.
[35] Gerelmaa, L., & Kotani, K. (2016). Further investigation of natural resources and economic growth: Do natural resources redress economic growth. *Resources Policy*, *50*, 312–321.
[36] Apergis, N., & Payne, J. E. (2014). The oil curse, institutional quality, and growth in MENA countries: Evidence from time-varying cointegration. *Energy Economics*, *46*, 1–9.
[37] Inuwa, N., Adamu, S., Sani, M. B., & Modibbo, H. U. (2022a). Natural resource and economic growth nexus in Nigeria: A disaggregated approach. *Letters in Spatial and Resource Sciences*, *15*, 17–37. https://doi.org/10.1007/s12076-021-00291-4.
[38] Inuwa, N., Adamu, S., Hamza, Y., & Sani, M. B. (2023). Does dichotomy between resource dependence and resource abundance matters for resource curse hypothesis? New

evidence from quantiles via moments. *Resources Policy*, *81*, 103295. https://doi.org/10.1016/j.resourpol.2023.103295.

[39] Ozturk, I. (2017). Measuring the impact of alternative and nuclear energy consumption, carbon dioxide emissions and oil rents on specific growth factors in the panel of Latin American Countries. *Progress in Nuclear Energy*, *100*, 348–368.

[40] Liu, K., Bai, H., Wang, J., & Lin, B. (2018). How reduce energy intensity in China's heavy industry: Evidence from a seemingly uncorrelated regression. *Journal of Cleaner Production*, *180*, 708–715.

[41] Greene, W. H. (2003). *Econometric analysis*. Pearson Education India.

How to Cite: Inuwa, N., Bello, M., & Sani, M. B. (2023). Resource Curse in WAIFEM Member Countries: An Application of Seemingly Unrelated Regression. *Green and Low-Carbon Economy*. https://doi.org/10.47852/bonviewGLCE3202485