

Trade In Natural Resources, Institutional Quality and Economic Growth in Sub-Sahara African Countries

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ABSTRACT

This study seeks to analyse the impact of trade diversification and institutional quality on economic growth in Sub-Sahara African Countries using the dynamic panel system generalized method of moments (Sys-GMM). The study employed annual panel data comprising 48 Sub-Sahara African Countries ranging from 2003 to 2024. The model has the economic growth measured by GDP growth rate (GDPR) as the dependent variable while trade in natural resources (TNRS) and institutional quality (INSQ) are the independent variables of interest. The control variables from the model are population growth rate (PGR), logistics performance (LOGIS), labour (LAB) and capital (K). The results revealed that, trade in natural resources is positive but statistically insignificant on economic growth in Sub-Saharan Africa within the period under study. The implication is that trade in natural resources has an increasing effect on one economic growth in SSA. On the other hand, institutional quality established a positive impact on economic growth though the impact is insignificant. This implies that SSA countries still have weak institution as evident in poor governance, uncontrolled corruption and weak regulatory quality. For the control variables, the coefficient of labour had a positive impact on economic growth but the coefficients of population growth rate, logistic performance and capital were found to be negatively impacting on economic growth. Only labour showed a significant effect while population growth rate, logistic performance and capital were insignificant. The empirical implication is that SSA still have weak institution, rapid growing population with little contribution to economic growth and weak logistic performance. Finally the negative effect of capital signifies the cost of borrowing money for business and investment in SSA counties are too high to bring about significant contribution to economic growth.

KEYWORDS

Trade in Natural Resources, Institutional Quality, Economic Growth, Sub-Sahara African Dynamic Panel Sys-GMM

I. INTRODUCTION

The continent of Africa has long been noted for having considerable amount of natural resources endowment. According to United Nations Economic Commission for Africa (UNECA), the Sub-Sahara Arica region is known to have more than 40 percent of the worlds' resources of Platinum Group Minerals (PGMs), phosphate, gold cobalt, vanadium, vermiculite, chromate, manganese and diamonds. The region has also been ranked first in the production of platinum, gold, chromate, vanadium, cobalt and diamonds. Africans

importance as a source of oil, gas and other energy resources is increasing.

Natural resources constitutes an important source of gross domestic product for most Sub-Saharan African countries. Yet, rents from natural resources are solely not sufficient to bring about economic prosperity and progress. Over the last few centuries, the relationship between natural resources and economic growth reveals mixed results. In the nineteenth century and end of the first half of the twentieth century, countries like Australia, Scandinavian, and United States recorded positive development experiences in which natural resources played a significant role in stirring economic growth. However, it is hard to find such successful experiences in the second half of the twentieth century because countries that largely depend on natural resources, have been associated with the "Natural Resource Curse" thesis.

Countries with poor economic governance of weak institutions adopt inadequate industrialization policies that do not structurally change their economies (Matti, 2009). This observation may be heightened during periods of abundant natural resources exploitation. Other studies find negative effects of resources, through institutional decay, to economic growth. In this regard, it is pertinent for Sub-Saharan African countries that rely mainly on rents from natural resources to channel their development towards understanding how robust institutions could positively impact on the relationship between natural resources and economic growth.

Economic theory argues that institutions determines how natural resources are harnessed. This influence is conceived in term of competing or complimentary interests between institutions and production in the natural resources sector. Mehlum, Moene and Torviks (2006), is of the opinion that production and rent-seeking are competing if the most effective rent-seeking activities are located outside the productive part of the economy. Thus compacting scenario encourages rent-seeking behaviour and vested interest that may bias the management of gain from natural resources through weak institutions. This may in turn, negatively affect economic growth and potential shared prosperity.

Recent empirical studies show that institutions play a vital role in development and consolidating economic growth (Mehlum, Moene & Torviks, 2006; Mavrotas, Murshed & Torres, 2011 and Sala-i-Martin & Subramanian, 2013). Good institutional quality is a pre-requisite for economic growth. Therefore, how institutions are governed should significantly affect natural resources sectors. Collier and Hoeffler (2005) posits that natural resources is likely increase the chances of political instability, which should probably be negative for growth. In the same vein, Omgba (2010) argues that with increasing wealth from resources, the payoff from staying in power grows and politicians tend to avoid adopting good governance practices that should lead to poor growth performance.

Some empirical studies have examined the impact aggregate and disaggregated institutional quality on economic growth. Ashraf, Luo and Khan (2022) established that institutional quality has a spillover effect on economic growth and prosperity. Shittu, Musibau, & Jimoh (2022) found that institutional quality negatively influenced the economic growth of MENA African Countries. This is also because most African countries institutional quality has been considered weak over the years. Some studies also suggest that the nature of natural

resources also affects the link between institutions and resources. Various studies demonstrate that the “point” (concentrated) natural resources lead to bad institutions, while diffused resources do not. This is so that, point resources (such as crude oil minerals and plantations) may be secured and controlled at comparatively low expenses and are available from a limited geographic or economic basis. On the other hand horizontally oriented agents exploit diffuse natural resources (such as agricultural product) dispersed throughout space. These have less of a correlation with institutional quality.

Hence taking into consideration the abundance of natural resources in Sub-Sahara African and the nature of institutional qualities in the region, it is pertinent to examine how institutional quality moderates the impact of natural economic growth of the resource rich countries in Sub-Sahara African. This is built on the premise that countries with strong institutions are more likely to drive economic growth and development.

This study will contribute to existing literature in different folds. Firstly it will analyse the effort of trade in natural resources utilizing resource rent in Sub-Sahara African countries. The study collected panel data covering 46 countries as against many studies that have studies may less than the number of countries in this study, secondly, the incorporation of institutional quality into the study has added a novel dimension to the study. The study seeks to establish if strong institutional quality act as a vital bridge that will transform wealth from a potential “resource curse” into sustainable economic growth in Sub-Sahara African. Lastly, the study adopts the dynamic Panel System Generalized Method of Moments (SYS-Gmm) technique employing annual data to achieve the objective.

The remainder of the paper has been structure as follows; in the next section, we explore the theoretical framework, followed by the review of relevant literature. In section four, we explain data source and methodology including model specification. Section five is dedicated to the analysis, interpretation and discussion of main results while we conclude in last section with policy implication and recommendations.

II. THEORETICAL REVIEW

This study examines the influence of trade diversification and institutional quality on economic growth (GDPR) in SSA via the lens of two principal economic theories: Endogenous Growth Theory (EGT) and New Trade Theory. These frameworks offer complementary insights into how trade in natural resources (TNRS) and institutional quality (INSQ) interact to influence regional economic dynamics.

EGT, articulated by Romer (1986) and Lucas (1988), asserts that GDPR is predominantly propelled by internal variables rather than external influences. This theory contrasts with classical growth theories by positing that knowledge, innovation, and human capital are essential drivers of progress, rather than treating technological advancement as an external factor. Investment in research and development (R&D), education, and infrastructure is regarded as essential for maintaining long-term economic growth.

In the notion of SSA, EGT explains how improvements in trade diversification, and

institutional quality (good governance, lower corruption, better regulatory quality etc.) can stimulate productivity and economic performance. Regional trade acts as a mechanism for knowledge spillovers, innovation diffusion, and the creation of dynamic economies of scale. Regional Trade Agreements (RTAs) promote the inter-border movement of commodities, services, and labour allowing for the reallocation of resources to more efficient applications.

Moreover, the theory underscores the essence of capital formation as a conduit for technology transfer and capacity building. In SSA, capital investments into sectors such as energy, manufacturing, and ICT has increased capital formation and stimulate employment and innovation. However, the realization of these benefits is contingent on complementary investments in institutional quality and trade diversification as emphasized in the empirical literature reviewed. This paper posits that regional integration projects, such as the AfCFTA, serve as catalysts for endogenous growth by facilitating market expansion, fostering innovation, and permitting investment in productive areas.

New Trade Theory (NTT), initiated by Krugman (1979, 1980), contests conventional comparative advantage models by incorporating economies of scale and network effects into trade research. The idea posits that trade may emerge even across analogous countries and industries as a result of increased returns to scale and product differentiation. It offers a robust theoretical justification for regional integration and the advancement of trade within the industry.

For SSA, NTT supports the argument that RTAs such as AfCFTA can lead to efficiency gains through specialization, expanded market access, and the exploitation of scale economies. As SSA countries trade more among themselves, they can reduce production costs, enhance competitiveness, and develop regional value chains that support industrial growth and job creation.

This framework also highlights the significance of trade diversification and policy harmonization. Without adequate institutional quality (transport networks, customs efficiency, and regulatory alignment), the benefits of economies of scale and trade-induced growth may not materialize. The theory aligns with empirical findings that emphasize the positive role of trade infrastructure and regulatory quality in facilitating intra-African trade and investment. Furthermore, by promoting product diversity and fostering competition, NTT suggests that regional trade can enhance consumer welfare and stimulate innovation, which are essential for sustainable development in SSA.

III. LITERATURE REVIEW

The impact of natural resource endowment and economic growth has been considerably examined in empirical literature, providing understanding in to how natural resource endowment influences economic growth or otherwise. Carmel, Qin and Zhong (2025), assessed how the quality of regulations and foreign direct investment (FDI) can assuage the resource curse when they interconnect with natural resources in the East African Community (EAC). The study employed the OLS and 2SLS approach, built on panel data spanning a long-term from 1996-2022. Besides, other methods are utilized like fixed effects (FE) in the

absence of AR (I) Specification and Generalized Moments Method (GMM), to scrutinize outcomes and guarantee the strength of results. The empirical results established that resources had a negative significant relationship with economic growth confirming the resource curse hypothesis; secondly, combining FDI and regulatory quality, with natural resource, reverses the negative effect of natural resource on economic growth to launch the resource blessing in East Africa Community (EAC) nations. The study, therefore, recommended a build-up of the regulatory apparatus that would guarantee openness and continuity in the administration of their resources. By appealing more judicious FDI and encouraging a diversified economy, these nations can revamp natural resource rents into long-term growth. No doubt, this study has thrown appreciable knowledge to the subject matter, it is important to address its constraints especially as regards the generalizability of the results to other contexts. The peculiarities of the socio-economic, political and institutional state in East African Community (EAC) may not be the same with other African nations or other regions of the world.

Sigh, Sharma, Radulescu, Balsalobre-Lorente and Bansal (2024), evaluated the influence of natural resources rent on the economic growth in some prominent advanced nations of the world (P5 + 1 countries namely; US, UK, France, China, Russia and Germany). They utilized a quantile-on-quantile regression to investigate this effect on various quantiles and a cross sectional autoregressive distributed lag (CS-ARDL) method for the panel of these six nations. The findings revealed a negative relationship between natural resources rent and economic growth for the panel but a different result on quantile in each nation. A positive impact was recorded for both lower and higher quantiles if natural resources and economic growth for china and US alone on the contrary, no causality was established for the other four nation included in the panel. They recommended that nations should invest in renewable natural resources, institute short term profit tax to shield consumers from rising energy prices and increase energy efficiency in households and industry. However, the findings from the sample of nations in this study cannot be generalized for sub-Saharan Africa countries.

Hamza, Golam and Azam (2023) analyzed the nexus between natural resources, institutional quality and economic growth in 43 resource abundant African nations, vis-à-vis 9 non-resource abundant African nations. The study employed yearly data ranging from 1980-2020 in 52 African nations. The study utilized the Driscoll-Kraay estimation technique to provide accurate and robust coefficients in the models. The results of the study established that resource-endowed African nations are inclined to greater economic growth levels in contrast to their non-resource endowed nations. Unusually, the study revealed that institutional quality has an insignificant impact on economic growth for both natural resource base and non-natural resource based African nations. Furthermore, the study broke-up natural resources into natural gas, oil and mineral resources, natural gas turned-up as a resource with no statistically significant effect on economic growth in both natural resource-based and non-natural resource based African nations. On the contrary, oil and mineral resources revealed an enhancement on economic growth. However, the study's findings may be influenced by the heterogeneity of the countries analysed. Besides, the study could further explored renewable natural resource endowment on economic growth.

Olaifa, Olubiyi, Oluwasegun and Adebayo (2023), investigated the level to which natural resource endowment affect economic growth with empirical verifications from samples from

Sub-Saharan African countries. The study took a sample of seven countries namely; Cameroon, Cote d'Ivoire, Gambia, Ghana, Kenya, Nigeria and South Africa. Employing the pedroni panel cointegration estimation, the study showed that in general, natural resource endowment does not necessarily affect growth positively as it is anticipated. The study, therefore, concluded that the possession of natural resources does not affect growth positively in SSA. However, excessive royalties and rents on these endowments grow public income in the short-term, the discouragement it generate to intending investors of these endowments in the long-term should be the paramount attention. The study suggested that the high rents effect on growth in the long-term should be taken into consideration by policy maker when considering resource rents. However, the study highlighted data on arable land and forest land rent only in their model. There is an apparent omission of variables such as oil and mineral resources which play a major role in the economic growth of most countries sampled in the study. Therefore, the results from the study could be misleading due to model misspecification.

Adekunle, et al (2023) examined natural resource endowments and growth dynamics in Africa with verifications from a panel counteraction regression. The study utilized data representing the diversified strings of natural resources endowments (oil rent, coal rent and forest rent) to establish evidence on economic growth. The study revealed a positive impact between oil rent, coal rent and economic growth in Africa. On the contrary forest rent is negatively connected to economic growth in Africa. For the controlled variables, trade and human capital are favourably related to economic growth while population growth in inversely connected with economic growth in Africa. However, the findings of this study are constrained to the data available from authorized sources as well as the scope and extent of information accessible during the course of the research. Therefore, the results may not be applicable to the present study.

Ajide (2022), investigated the causal relationship between natural resource curse and economic complexity for a panel of 32 African nations using a long-term data from 1993-2018. Adopting a couple of estimators including pooled OLS fixed effects, random effects and generalized methods of moments (GMM), the following result were revealed. It was verified that the regularity of natural resource curse thesis is unconditionally built on economic complexity across the model specification both in aggregate and disaggregated terms. The path dependent effects of economic complexity are equally registered across board. Again, the confounding roles of financial development and infrastructural facilities are difficult to ignore across the model. Finally, the robustness checks, the institutional and human capital routes as well as the impact of economic-social shocks are further explored. Interestingly, while the unconditional impacts of each of these channels are regularly certified on the one hand, the conditional effects of both mechanisms with respect to the key explanatory variables (natural resource rents) are statistically redundant on the other hand. The study's data limitations may affect the applicability of its conclusions to the current economic dynamics.

Chernor and Mohamed (2022), evaluated the effect natural resources on economic growth linking human capital development. The study utilized dynamic ordinary least square (DOLS) and Vector Error Correction Model (VECM) approaches in a panel dynamic analysis. The findings established that natural resources and trade openness are the driving force to lower economic growth. Conversely, labour force, physical capital and human capital development

indices are productive is increasing another. More so, the parameters for tertiary school enrolment (TSE) is more than that of secondary school enrolment (SSE) in the models. This imply that TSE achieve greater than SSE in terms of increasing natural resources to alleviate economic growth. They suggested that policy makers in such nations should bring up policies that would enhance human capital development.

Aslan and Altinoz (2021) analyzed the relationship between natural resources, gross capital formation, globalization and economic growth in developing nations from European, Asian, African and American continents. The study employed the Panel Vector Auto regression (PVAR) method to ascertain this relationship from 1980 to 2018. The findings revealed that natural resources and globalization have direct influence on economic growth in American, Asian and European nations, but capital formation inversely influence economic growth. The impact of globalization and gross capital formation is direct while natural resources had an inverse effect on growth in African nations. In all the continents, it was established that there is bidirectional causality between globalization and economic growth. Again, a bidirectional causality was identified between capital formation and economic growth in Europe and Asia, then between natural resource and GDP in Asia and America, though there is unidirectional causality from economic growth to natural resources in Europe, from capital formation to economic growth in America and Africa, from economic growth to natural resources in Europe and from natural resource to economic growth in America. With respect to the findings, the study concluded that going forward, growth models can no longer do without the natural resource rents and globalization. However, the study adopted the panel vector auto regression (PVAR) and this method only incorporates data from within the system. The PVAR depend mainly on the past data within the system to make predictions. This implies that the model only utilize previous value of time series data to forecast future values. The findings therefore, may not reflect the current situation in Sub-Saharan Africa.

Hayat and Muhammad (2021), analysed the effect of natural resources volatility on economic growth. The study concentrated on UAE, Saudi Arabia, and Oman given their endowment in natural resources. Utilizing data from 1970-2016 and adopting the autoregressive distributed lag (ARDL) cointegration approach, they established that both natural resources and their volatility is significant from the angle of growth. The results revealed a powerful positive and statistically significant nexus between natural resources and economic improvement for UAE and Saudi Arabia. Comparably, a positive but insignificant nexus was noticed connecting natural resources and economic growth in Oman. Conversely, the study revealed that the volatility of natural resources is negatively statistically significant on economic growth of all three countries under review. However, focusing solely on these richly endowed countries in the middle-east limit the generalizability of their findings to SSA region.

Ben-Salha, Dachraoui and Sebri (2021), examined the causal connection between gross natural resource rents and economic growth in a sample of high resource abundant nations

Over the period 1970 to 2013. The utilization of Pooled Mean Group (PGM) estimator unveiled interesting results. It was revealed that in the long-run, natural resource rents affect economic growth positively, while in the short-run the relationship was found to be negative. On the contrary, the causality test revealed a causality between the two variables. The short-run country specific analysis established the heterogeneity of results across

countries, which forms a debate whether the use of PGM estimator when estimating resource rent economic growth relationship is appropriate or not. Besides the study's reliance on data up to 2013 is way too obsolete for recent global economic changes.

Adabor, Buabeng and Djomo (2021) analyzed the asymmetric impact of oil and gas rent on economic growth in Ghana for the period 2010 to 2019, pitching on the myth that natural resource exploration has a two way impact on economic growth. Adopting the non-linear autoregressive distributive lag (NARDL) mode as estimation approach, the study established that oil and gas rent impact economic growth asymmetrically. Precisely, the NARDL results revealed that oil resource rent improves economic growth significantly, providing practical proof in lure of the resource blessing hypothesis. Conversely, gas resource rent showed a significant negative impact on economic growth, providing practical proof in time of the resource curse hypothesis. They suggested that policies should be tilted towards promoting the diversification oil terms than the gas firms in the short-run. However, the data set used for the study is too small. The study used a sample of only 10 years which is too small to make a generalization.

Ampofo, Cheng, Asemte and Basah (2020), investigated the effect of total natural resource rent on economic growth by employing the nonlinear autoregressive Distributive Lag (NARDL) for top ten mineral rich countries in the globe for the period 1981-2017. The result of the study established a nonlinear cointegration between the variable in Australia, Brazil, Canada, the Democratic Republic of Congo (DRC), India and Saudi Arabia. The long-run asymmetric impact revealed that total resource rent has an inverse impact on economic growth in Australia, DRC and India, therefore, corroborating with the resource curse hypothesis in these nations. On the other hand, the results revealed that natural resource rents has a positive impact on economic growth in Canada and Brazil, asserting that natural resources impact positively to economic growth, therefore, an advantage to these economics. The findings also confirmed a positive shock to trade openness has a corresponding effect on economic growth in most of the countries. The causality test revealed that natural resource rents does not cause economic growth in most of the countries sampled for the study. The study suggested execution of more trade liberalization policies to optimize the gains from trade openness, specifically in the countries where the natural resource curse hypothesis exhibited. However, the study focuses on only 10 countries which are top mineral rich countries and so may limit the generalizability of the findings.

Topcu, Altinoz and Aslan (2020), evaluated the impact of natural resources, energy consumption and gross capital accumulation on economic growth within the period 1980 to 2018 in 124 nations grouped into various income strategy utilizing the Panel Vector Autoregressive (PVAR) method. The models produced divergent result based on low, middle and high-income nation groupings. For the high-income nations, gross capital formation, urbanization and energy consumption had a direct effect on economic growth while the

Coefficient of natural resources is positive but statistically insignificant. The middle income nations portrays that a rise in natural resources, energy consumption and urbanization also lead to a rise in economic growth. And for the low-income nations, natural resources and energy consumption directly impact economic growth but capital formation has an inverse effect on GDP. Therefore, the natural resources curse hypothesis was invalid in all samples.

The results gotten from the global sample established that natural resources, energy consumption, and gross capital formation have various impact on economic growth based on the levels of income of the nations and provided a new direction on policy making procedure.

However, the study's reliance on data up to 2018 may not account for recent global economic changes. Qiang and Jian (2020), investigated the link between natural resource endowment, institutional quality and China's regional economic growth. Employing panel data from 2005 to 2018, the study revealed that the resource curse proposition is valid at the provincial level in China. This is attributed to low quality market resource allocation system and property right system. Also, considering the spatial agglomeration of natural resources, there is a negative spatial correlation between economic growth, and the resource curse effect is more severe in areas where resources are more abundant. It was also established that natural resource endowment will impact the quality of the system. It was concluded that under the effect of the causal cycle mechanism, the lower the quality of the system, the more severe the resource curse effect.

Mahamad (2023), examined the relationship between natural resource endowment and economic growth employed a sample of Western African nations. Utilizing a Borrow type growth model to investigate the influence of natural resource endowment on economic growth, the study adopted panel estimation method utilizing applicable data from Western African nations. The findings revealed that natural resource endowments have infinitesimal influence on improving the economic growth in West Africa, especially, in resource abundant nations. The reasons for this minimal influence on growth is attributed to high corruption in public sector as well as continuous unrest in resource based regions in West Africa.

The study suggested that these nations need, essentially, to enhance control of natural export revenue and adopt constructive blueprints to eliminate occurrences of unrestrained corruption in the government sector. The study's data limitations may affect the applicability of its conclusions to the current economic context.

A. Nature and Scope of Data

To examine the effects of trade in natural resources and institutional quality on economic growth in sub-Saharan African countries, the study utilized annual panel data that covered 46 sub-Saharan African countries spanning from 2003-2024. The dependent variable of interest is economic growth, measured by GDP growth rate while trade in natural resources and institutional quality are the independent variables of interest. The control variables in the model are population growth rate, logistics performance, labour and capital. The data for this study is secondary data sourced from World Bank Development Indicators (2024) and International Monetary Fund.

B. Method of Data Analysis

In analysing the impact of trade in natural resources and institutional quality on economic growth (GDPR) in SSA nations, the research will employ annual panel data encompassing 46 SSA nations from 2003 to 2024. The variables of interest include economic growth, represented by the GDP growth rate (GDPR), trade in natural resources (TNRS), institutional

quality (INSQ), population growth rate (PGR), logistics performance (LOG), labour (LAB) and capital (K) of SSA nations, obtained from the World Bank (WB, 2024).

This study embraced the dynamic panel system generalized method of moments (system GMM) estimation method in achieving the specific objective of the study. The system GMM estimator is deemed appropriate for this study as it addresses the issues of endogeneity associated with the lagged regress and variable in the dynamic panel data model, along with omitted variable bias, unnoticed panel heterogeneity, particularly when the sample cross-section exceeds the time series (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998). These issues are typically linked to pooled ordinary least squares and causal estimation methodologies. Furthermore, the studies by Blundell & Bond (2000) and Windmeijer (2005) demonstrate that the system GMM estimator improves accuracy and mitigates fixed model bias in the first-difference GMM estimator. To confirm the appropriateness of the system GMM estimator for this investigation, the Bond (2002) test will be administered for all equations.

C. *Model Specification*

To estimate the impact of trade in natural resources and institutional quality on economic growth in Sub-Saharan African countries, the study employed Arellano & Bond (1991) system generalized method of moments (Sys – GMM), a linearly reduced form of dynamic panel data model specified thus:

$$Y_{it} = \alpha_0 + \phi Y_{it-1} + \lambda X_{it} + \beta V_{it} + \alpha_i + \varepsilon_{it} \quad (3.1)$$

Where Y_{it} = Dependent variable for cross – sectional unit i in period t (Economic growth), X_{it} = Vector denoting proxies for independent variables (regional trade) observed for country i in period t , V_{it} = Intervening variables, α_i = i -th unobservable time invariant country – specific effects that is independent and identically distributed in country i ε_{it} = idiosyncratic disturbance term specific to country i and is assumed to independent and identically distributed over all the time periods in country i and Y_{it-1} = natural logarithm of lagged dependent variable (economic growth).

To examine the individual impact of trade in natural resources and institutional quality on economic growth in SSA, an econometric model will be formulated with GDP growth rate as the dependent variable against trade in natural resources and institutional quality as independent variables of interest. The controlled variables for the model are population growth rate, logistics performance, labour and capital. This will help determine the contribution of each of the independent variables on economic growth in sub-Sahara African countries.

Given the implicit function, the GMM can be specified thus:

Model investigating the impact of regional in natural resources and institutional quality on economic growth in Sub-Sahara African

$$GDPR_{it} = \alpha_0 + \alpha_1 GDPR_{it-1} + \alpha_2 TNRS_{it} + \alpha_3 INSQ_{it} + \alpha_4 PGR_{it} + \alpha_5 LOGIS_{it} + \alpha_6 LAB_{it} + \alpha_7 K_{it} + \varepsilon_{it}$$

Where:

GDPR _{it} = economic growth of country i at time t
GDPR _{it-1} = lag economic growth of country i at time t
TNRS _{it} = regional trade in natural resources of country i at time t
INSQ _{it} = institutional quality of country i at time t
PGR _{it} = population growth rate of country i at time t
LOGIS _{it} = logistic performance of country i at time t
LAB _{it} = labour of country i at time t
K _{it} = capital of country i at time t
ε _{it} = Composite error term
i = country indicator
t = time (2003, 2004, 2005, 2024)

D. Results and Findings

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Gdpr	902	4.074667	4.9323	-36.39	38
Tnrs	899	6869.129	14976.93	4.4	123572
Insq	896	.074442	.7995311	-2.2	4
Pgr	901	2.538224	1.145082	-2.68	6.18
K	901	17.12952	15.41856	-74.51	124.05
Lab	900	66.42026	11.35443	38.55	89.45
Logis	902	3.691109	.7472857	1.43	4.93

Table 1 shows the descriptive statistics for the variables Economic growth (GDPR_{it}), trade in natural resources (TNRS_{it}), institutional quality (INSQ_{it}), population growth rate (PGR_{it}), logistic performance (LOGIS_{it}), labour (LAB_{it}) and capital (K_{it}) with mean values of 4.074667, 6869.129, .074442, 2.538224, 3.691109, 66.42026, and 17.12952. The standard deviation values are 4.9323, 14976.93, 0.7995311, 1.145082, 0.7472857, 11.35443, and 15.41856, in which most of them are smaller to their mean values respectively.

The implication of this result is that the average annual economic growth rate of 4.07% in Sub-Saharan Africa (SSA) is an indication that the region is growing steadily as they engage in trade within the region. The growth rate is impressive despite the Covid-19 pandemic that affected global economy. The SSA countries can do better with good policy implementations. The average trade in natural resources of that magnitude reflected a high

value and significant deposits of natural resources in SSA countries, but these resources could be the reason for over reliance resulting to resource-curse in some SSA countries.

The average institutional quality of score of 0.074 is a reflection of weak governance or institutions, poor policy implementation, high corruptions, weak rule of law. The population growth rate of 2.53 in SSA implied that population is growth rapidly annually, which is good as there would be increase in aggregate demand but the pressure on jobs, infrastructure and resources would be too high. In the case of average logistic performance of 3.69 revealed a poor performance. For average labour of 66.42, the implication is that there is a high level of skill labour force that are active but under-utilized, thus creating skills gaps in SSA countries. Finally, for average capital, it revealed that high cost of capital can affect local firms, limit investment and make SMEs to struggle financially.

E. Correlation Analysis

Table 2: Correlation Matrix for all the variables in the models

	GDPR	TNRS	INSQ	PGR	K	LAB	LOGIS
GDPR	1						
TNRS	-0.0464	1					
INSQ	0.1001	-0.0827	1				
PGR	0.2274	-0.1062	-0.1201	1			
K	0.0499	0.0056	0.1139	0.1760	1		
LAB	0.1247	0.1164	-0.0035	0.3559	0.0213	1	
LOGIS	-0.0408	0.0691	0.1446	-0.0357	-0.2115	-0.1149	1

Table 2 shows result of the matrix correlation for Economic growth ($GDPR_{it}$), trade in natural resources ($TNRS_{it}$), institutional quality ($INSQ_{it}$), population growth rate (PGR_{it}), logistic performance ($LOGIS_{it}$), labour (LAB_{it}) and capital (K_{it}). The control variables, institutional quality ($INSQ_{it}$), population growth rate (PGR_{it}), labour (LAB_{it}) and capital (K_{it}) correlate to economic growth positively, by 0.86%, 1.34%, 1.48%, 10.0%, 22.7%, 4.99%, and 12.47%. While trade in natural resources ($TNRS_{it}$), and logistic performance ($LOGIS_{it}$) were found to correlate negatively to economic growth with the correlation values of -4.64% and 4.08% respectively. The correlation values were found to be weakly correlated to the dependent variables. They all show a weak correlation. The implication is that there is potential of trade in natural resources ($TNRS_{it}$), pulling positive economic growth in SSA countries if they can enhance their institutional quality and policy implementation.

F. Cross-Sectional Dependence Test

Table 3: Cross-sectional Dependence Result

Residual Cross-Section Dependence Test	
Null hypothesis: No cross-section dependence (correlation) in residuals	
Periods included: 22	

Cross-sections included: 41			
Total panel (unbalanced) observations: 866			
Note: non-zero cross-section means detected in data			
Test employs cantered correlations computed from pairwise samples			
Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	1.7611	820	0.0913
Pesaran scaled LM	2.24118		0.0520
Pesaran CD	1.71226		0.0709

From the results in table 3 above, the null hypothesis (no cross-sectional dependence) was not rejected predicting the absence of cross-sectional dependence for all the variables across countries at the 5% level of significance. The implication is that each series contains cross-sectional independence, suggesting that a shock occurring in one of the African countries may not affect or cannot be transmitted to other countries.

Table 4: Choice of System-GMM and Difference-GMM for investigating the impact of regional in natural resources on economic growth in Sub-Sahara African

Variable	Pooled	Fixed Effect	Diff-GMM
GDPR _{<i>i, t-1</i>}	.3074189**	.2472528**	.2134334**
TNRS _{<i>i, t</i>}	-6.35e-06	-.0000132	.0002168
INSQ _{<i>i, t</i>}	.4583584**	.3372006	-.012348
PGR _{<i>i, t</i>}	.5487112**	1.198829**	.1673186
LOGIS _{<i>i, t</i>}	-.1986579	-2.223255**	-2.145205**
LAB _{<i>i, t</i>}	.0188016	.1321793**	.586906**
K _{<i>i, t</i>}	-.001787	.02421	.0044425
Constant	1.009873	-.8581319	-29.82776**
N	848	848	804
R ²	0.1566	0.0852	-
F-stat	22.28**	14.46**	70.7.**

Note: ** show significance at 5%

The insertion by Bond (2001), on choosing between System-GMM and Difference-GMM, there is need to estimate the models with the dependent variable lag to obtain the coefficient by Pooled regression, Fixed effects and Diff-GMM methods. If the estimated coefficient of the dependent variable of Diff-GMM is close to the Pooled regression method, then the Diff-GMM is a better estimator than the sys-GMM. But if the Diff-GMM is close to the fixed effect

method, then the SYS-GMM is a better estimator. From the result in Table 4, the coefficient of fixed effects 0.2472528 is closer to the coefficient of Pooled regression of 0.3074189 than the coefficient of Diff-GMM of 0.2134334. Thus, the Sys-GMM was found to be a better estimator than the difference-GMM.

G. Estimation of the Model

$$GDPR_{it} = \alpha_0 + \alpha_1 GDPR_{it-1} + \alpha_2 TNRS_{it} + \alpha_3 INSQ_{it} + \alpha_4 PGR_{it} + \alpha_5 LOGIS_{it} + \alpha_6 LAB_{it} + \alpha_7 K_{it} + \varepsilon_{it}$$

Table 5: Result of System-GMM for investigating the impact of regional in natural resources and institutional quality on economic growth in Sub-Sahara African

Variable	System-GMM		P-value
$GDPR_{i,t-1}$	.230998		0.000**
$TNRS_{i,t}$	.0000502		0.414
$INSQ_{i,t}$	.1019493		0.593
$PGR_{i,t}$	-.6932059		0.151
$LOGIS_{i,t}$	-.5290781		0.630
$LAB_{i,t}$	.2411143		0.013**
$K_{i,t}$	-.0058501		0.863
Constant	-9.360959		0.277
N		848	
R ²		-	
F-stat	92.34		0.000**
AR-1	-4.1329		0.000**
AR-2	-1.5455		0.1222
Sargan Test	2.457		0.5498

Note: ** show significance at 5%

Table 5, shows the estimated coefficients for Arellano and Bover/ Blundell and Bond (Sys-GMM). The value of the AR (1) for SYS-GMM indicated that there is presence of serial correlation between the lagged dependent variable. However, the AR (2) for Sys-GMM revealed the absence of correlation. Thus, signifying the validity of Sys-GMM. The Sargan Test confirmed the adequacy of the sys-GMM. It showed that the null hypothesis which is over-identifying restrictions are valid is upheld.

The lagged effect of $GDPR_{it-1}$ on the current GDP is positive and significant at 5% level, for SYS-GMM. This means that the present value of GDP dependent on the effect of the past value, indicating that what happens in the current year was predicted by what happened the previous years.

The effect of trade in natural resources ($TNRS_{it}$) on GDP is positive but statistically insignificant at 5% level, for SYS-GMM result. This means that the trade in natural resources ($TNRS_{it}$) showed an increasing effect on economic growth in Sub-Sahara Africa, indicating that the trade in natural resources ($TNRS_{it}$) in the region is a good determinant in

enhancing economic growth in the region when it has been transformed. But, without efficient transformation of the natural resource, resulting in the insignificant effect of trade in natural resources (TNRSit) on economic growth.

The coefficients of institutional quality (INSQ), and labour (LAB) were found to positively impact on economic growth rate of SSA countries within the period of 2003 and 2024. But the coefficient of population growth rate (PGR), logistic performance (LOGIS), and capital (K) were found to be negatively impacting on GDP of SSA countries. This implies that institutional quality (INSQ), and labour (LAB) having positive effect on GDP, only labour (LAB) showed a significant effect on GDP while institutional quality (INSQ), population growth rate (PGR) and logistic performance (LOGIS) were insignificant. Though INSQ is positive while PGR, LOGIC and K are negative. The result indicated that SSA countries still have weak institutions, unproductive rapid growing population with little contribution to economic growth, and weak logistic performance. However, productive labour force has contributed significant to the GDP of SSA countries owing to the increased trade liberalization and educational revolution in SSA countries. Finally, the negative effect of capital signifies the cost of borrowing money for business and investment in SSA countries are too high to bring about significant contribution to economic growth. Again, over the years, the capital investment has been very poor due to the poverty rate in the region affecting capital formation for investment.

IV. DISCUSSION OF FINDINGS

The result showed that there is no significant relationship between trade in natural resources and economic growth. The result did not support the studies of Carmel, et al (2025) who established that resources had a negative significant relationship with economic growth confirming the resource curse hypothesis; secondly, combining FDI and regulatory quality, with natural resource, reverses the negative effect of natural resource on economic growth to launch the resource blessing in East Africa Community (EAC) nations. Sigh, Sharma, Radulescu, Balsalobre-Lorente and Bansal (2024) findings revealed a negative relationship between natural resources rent and economic growth for the panel but a different result on quantile in each nation. A positive impact was recorded for both lower and higher quantiles if natural resources and economic growth for china and US alone on the contrary, no causality was established for the other four nation included in the panel. Olaifa, et al (2023) showed that in general, natural resource endowment does not necessarily affect growth positively as it is anticipated. Aslan and Altinoz (2021) findings revealed that natural resources and globalization have direct influence on economic growth in American, Asian and European nations, but capital formation inversely influence economic growth.

Adabor, et al (2021) revealed that oil resource rent improves economic growth significantly, providing practical proof in lure of the resource blessing hypothesis. Conversely, gas resource rent showed a significant negative impact on economic growth, providing practical proof in time of the resource curse hypothesis. Qiang and Jean (2020) there is a negative spatial correlation between economic growth, and the resource curse effect is more severe in areas where resources are more abundant. It was also established that natural resource endowment will impact the quality of the system. Mahamed (2013) findings revealed that

natural resource endowments have infinitesimal influence on improving the economic growth in West Africa, especially, in resource abundant nations. The reasons for this minimal influence on growth is attributed to high corruption in public sector as well as continuous unrest in resource based regions in West Africa.

Consequently, there is consistency with the current study and those of Hamza, Golam and Azam (2023) who established that resource-endowed African nations are inclined to greater economic growth levels in contrast to their non-resource endowed nations. Adekunle, Maku, Williams, Gbagidi and Ajike (2023) revealed a positive impact between oil rent, coal rent and economic growth in Africa. On the contrary forest rent is negatively connected to economic growth in Africa. Cherner and Mohamed (2022) findings established that natural resources and trade openness are the driving force to lower economic growth. Hayat and Muhammad (2021) revealed a powerful positive and statistically significant nexus between natural resources and economic improvement for UAE and Saudi Arabia. Comparably a positive but insignificant nexus was noticed connecting natural resources and economic growth in Oman. Ben-Salha, et al (2021) revealed that in the long-run, natural resource rents affect economic growth positively, while in the short-run the relationship was found to be negative. On the contrary, the causality test revealed a causality between the two variables. The short-run country specific analysis established the heterogeneity of results across countries, which forms a debate whether the use of PGM estimator when estimating resource rent economic growth relationship is appropriate or not.

V. CONCLUSION

Trade in natural resources and institutional quality have long been acknowledged as the fulcrum of economic growth in sub-Sahara African (SSA). This is achieved by fostering economic integration, enhancement of market access, promoting industrialization and creating business opportunities to scale across borders. However, SSA has consistently lagged behind other regions in term of intra-regional trade.

This study, therefore, explored the impact of trade in natural resources and institutional quality on economic growth in sub-Sahara African within the time frame of 2003 – 2024 instrumenting with the system- Generalized Method of Moments (system- GMM). The empirical findings from the study shows that trade in natural resources have positive but insignificant effects on economic growth in sub-Sahara African countries. The implication is that trade in natural resources in the region enhances growth but the natural resources needs to transformed to finished products to make a significant impact. On the other hand, the study revealed that institutional quality has positive impact on economic growth within the period under study though the impact was seen to be insignificant. This implies that SSA countries still have weak institutions as evident in poor governance, uncontrolled corruption and weak regulatory quality.

RECOMMENDATIONS

In consonance with the empirical findings of this study, the following recommendations were made:

The result from the system GMM indicates that trade in natural resources is positively related to economic growth but insignificant. Part of the reasons responsible for this in SSA countries include amongst others, the flagrant misappropriation of natural resources exports earnings through high-level of corruption in government coupled with the frequent occurrence of communal conflicts in resource endowed regions in SSA countries. The study, therefore, recommended that for SSA countries to fully benefit from trade in natural resources, stringent policy measures should be put in place to eliminate or reduce the cases of uncontrolled corruption in the public places. The institution of drastic actions to be taken on corruption officials like forfeiture of ill-gotten wealth and property, hasty prosecution and conviction of corrupt public servants, and denying such citizens the opportunity of holding public offices; will predominantly reduce the negative effect of corruption on economic growth.

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