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Resource Endowment and Economic Growth in Sub-Saharan African Countries

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ABSTRACT: *This study assessed the evidence of resource curse and identified whether Dutch disease explained resource curse in selected sub-Saharan African (SSA) countries if evident. The study used Secondary data for 14 sub-Saharan African countries endowed with natural resources. Annual data from 1981 to 2017 obtained from the World Development Indicators (2017) and open data for Africa. The study adopted panel cointegration and fixed effects panel data estimation. The results showed a positve and statistically significant relationship between resource endowment and economic growth. This implied that resource endowment has a positive effect on economic growth in sub-Saharan African countries, and there is no basis to identify whether Dutch disease explain resource curse in SSA countries. The study concluded that there is no evidence of resource curse found in SSA countries and suggested that resource-endowed SSA countries should discover profitable investment in order to re-invested proceeds from natural resources into other form of renewable physical capital assets.*

KEYWORDS: Resource endowment, resource curse, Dutch disease, sub-Saharan Africa

INTRODUCTION

Endowment in natural resources among sub-Sahara African countries (SSA) has been a subject of concern in Africa and across the world. The question is whether natural resource endowment translates to economic growth or not. Natural resources are believed to be catalyst for economic growth if manage appropriately. It serves as means for capital accumulation for developing countries to position their economy at the steady rate of growth. There seems to be two different perspectives on resource endowment and economic growth relationship. Some studies followed the Benign perspective that posited that natural resource endowment would assist the developing countries to transit from the stage of underdevelopment to that of industrial 'take-off', as obtained in such countries as Britain, United States of America, Russia, and Australia (Alpha and Ding, 2016; Baghebo, 2012 and Ross, 2006). Others had the view of Malign perspective that there exists a negative relationship between resource endowment and economic growth. The latter perspective is concerned directly with the explanation of economic and development tragedy refer to as resource curse (Xu, Jelinga and Deng, 2018; Pendergast, Clark and Kooten 2008).

On the side of negative correlation between economic growth and natural resource abundant, Rudd (1996) and Kolstad and Williams (2008) opined that the general problem underlying the reasons for low economic growth despite endowment in resource are due to factors that explain resource curse. These factors are Dutch disease, rent seeking, patronage and weak institutions (Onyejiuwa, 2019). Though Africa is deficient in most of the key indices of development, such as capital outlays, high profile industrialization, high standard of living, favorable Balance of Payments, low poverty index, equality in income distribution, openness to international trade, human capital (education and health), and good public infrastructures (Pendergast *et al.*, 2008). The first explanation of the negative relationship that exist between natural resource and economic growth has been traced to Dutch disease (Krugman, 1987). By definition, Dutch disease is the apparent relationship between the increase in exploitation of natural resources and a decline in the manufacturing sector (or agriculture) through the mechanism of spending effect and resource moved effect or appreciation of domestic currency in terms of foreign currency. It has been observed by Krugman (1987) that increase in extraction or exploration of natural resources lead to decline in manufacturing output, which in turn, leads to low economic growth. Although the evident of Dutch diseaase has been observed in other adavnced countries, however, the empirical verification has not been verified in most of the developing countries. This might be relatively in respect of the approach of measuring the endowment of resource.

The endowment in natural resources, which is expected to propel economic growth, can be measured either by the volume of resource export contribution to total export or the ratio of the revenue from the resource contribution to aggregate output (proxy by Gross Domestic Product, GDP). If a country resource export ratio to its total merchandize export is greater than or equal to 25%, then the country is endowed in natural resource (IMF, African Department Database, 2018). The transformation of resource exports and production into per capita terms is crucial in determining the extent to which resource rents have the potential to increase average living standards in a given country (De Soysa, 2002). If resource exports and/or production were measured in aggregate terms, then large countries with large populations would appear resource rich, when, in fact, the potential for resource revenue to impact overall standards of living could be quite small. Similarly, small countries with modest populations would appear resource poor, even if the available natural resources per capita were substantial. The key underlying fact that exists between resource endowment and dependence on resource is implying. A country cannot depend on a resource at a reasonable degree if that particular country is not endowed in it. Therefore, resource endowment measure first of all, the quantity of natural resource stock. That is, the rate at which natural resource contribute to GDP. And then, secondly, the rate at which resource-endowed country depend on the resource. That is, the rate at which natural resources export contribute to total export.

Therefore, this study intends to fill these gaps by determine whether resource is evident in sub-Saharan African endowed countries and also accounting for Dutch disease in the relationship between resource endowment and economic growth. Therefore, the vital questions the paper tend to finds answers are: has natural resource translated into economic growth in selected resource-endowed SSA countries and in the presence of negative correlation between resource endowment and economic growth, could it be as a result of Dutch disease? Thus, the paper tends to achieve the evidence of resource curse in selected sub-Saharan African countries and identify whether Dutch disease explain resource curse in selected sub-Saharan African countries if evident.

The study concentrated on 14 resource-endowed sub-Saharan African Countries and covered the period of 1981 to 2017. The selection of resource-endowed SSA countries is based on the IMF (2013) classification of natural resource export ratio to total export presented in Appendix.

LITERATURE REVIEW

Theoretical Literature

The Benign perspective sees resource endowment or abundance as a source of blessing to any countries that possessed such natural resources. The believe of early economist is that resource endowment act as a comparative advantage in international trade, and this notion comparatively lead to economic growth and development. This view is a conventional perspective that existed before the late 80s (Rosser, 2006; Akinlo, 2012; Baghebo and Atima), which was shared by many development theorists and neoliberal economists until the renaissance of new view in the 1980s. The underlying argument of the benign perspective is that natural resource endowment would assist the developing countries to transit from the stage of underdevelopment to that of industrial 'take-off', as obtained in such countries as Britain, the United States and Australia.

The poor performance of most resource–endowed countries in the 1980s experiencing low economic growth and development is hampered due to the 'resource curse' phenomenon (Akinlo, 2012). Sachs and Warner (1995) argued that natural resource abundance is harmful to growth which was as a result of many inherent factors. Extensive literature exists on the various channels through which natural resources, especially oil, harm growth. The major transmission mechanisms include Dutch disease, volatility argument and inefficiency in resource allocation argument, rent seeking activities, patronage and weak institutions.

The general argument is anchored on the fact that revenues from natural resources are very volatile, as they are driven by sharp and significant fluctuations in prices over relatively short periods of time (Akinlo, 2012). Consequently, in the face of fluctuating revenues, governments in the resource-endowed countries often find it extremely difficult to pursue a prudent fiscal policy. In addition, there is the general apprehension that windfall revenues arising from unanticipated high export prices would be used for consumption rather than being invested. Moreover, the activities of entrepreneurs engaging in rent seeking withdraw the economy productive rather than being unproductive. The existence of elite and political class destroys strong institutions that will check and balance political office holders' excessiveness, which may cause high profile corruption.

The study of natural resource curse has its root in the work of structuralist theses of the 1950s, focusing on the decline in the terms of exchange between primary and manufactured products (Prebisch, 1950), the volatility of primary product prices, or the limited linkages between the natural resource sector and the rest of the economy (Hirschman, 1958). However, none of these explanations was confirmed by empirical tests (Corden and Neary, 1982; van Wijnbergen, 1986). The problem is how the allocation of resources and sectorial structure are affected when a resource-exporting country experiences a resource boom. More specifically, de-industrialization will occur, that is, the industrial sector will (or agricultural sector) shrink in a resource boom. As a rule, the resource country is modeled to consist of three sectors, namely the resource sector, another exporting sector (industry) and a non-tradable sector. The resource boom raises national income, and demand for the non-tradable increases in the process, drives up the price of the non-tradable. The theory assumed a small country case with a constant price of the tradable, the relative price of the non-tradable rises (that is, an appreciation of the real exchange rate); production of non-tradables increase whereas output of manufacturing falls. The theory identifies the two components or effects of Dutch Disease: the spending effect and the resource-movement effect. The spending effect implies de-industrialization and a real appreciation. The second effect operating is the resource-moving effect. The resource sector and eventually the non-tradable sector attract resources which are withdrawn from manufacturing. In the "specific factor" model, propounded by Rudd (1996), assumed that one factor (capital) is specific to each sector in the short-run whereas the other factor (labor) is mobile. The wage rate is flexible. The resource movement effect reinforces de-industrialization and a real appreciation. Since both the relative price between non-traded and traded goods and the wage rate rise, output in the non-traded sector may rise or fall.

Mainguy (2010) provided a general presentation of the gold mining sector in Mali, its perspectives and challenges. This case study may be applicable to other mineral-developing countries which are not necessarily major actors on the world markets, but to which mining is vital. The case of Mali highlights the fact that widespread analyses, such as the Dutch disease and, to a certain extent, quality of institutions ones, are sufficiently relevant to explain the decline of cotton manufacturing firms. The case study method shows that the decline of cotton exports, which could be interpreted as one of the symptoms of the Dutch disease, indeed has shown how increase in gold mining sector could contract Mali manufacturing sector.

Another theoretical background explaining resource curse hypothesis is rent seeking theory and patronage hypothesis which manifest in an adverse mechanism that an abundance of natural resources leads to poorer governance and conflicts. This as well gives rise to governments that are less accountable to the people, have little incentive for institution-building, and fail to implement growth enhancing reforms. It also leads to higher corruption, more rent-seeking activity, greater civil conflict, and erosion of social capital (Rosser 2006).

Importantly, a rent-seeking theory argues that natural resource abundance generates an incentive for agents to engage in non- productive activities and state to provide fewer public goods than the optimum level as previously noted by Tornell and Lane (1999). The hypothesis identified that the mechanism through which increase rents from natural resource can harm growth is when entrepreneurs use their talents and business skills to undertake rent-seeking activities rather than running productive firms leading to a fall of output. Rent-seeking activities can be explained as a business of redistribution of an existing 'cake' rather than as expansion of the 'cake' and reinvestment of the 'cake' in more productive investment. The outcome of such activities reduces the net increase in income for a society, expand further income inequality and encourage corruption. Thus, exacerbating internal crisis among rent-seekers and the communities, and fight for rents itself leading to wars. Rent-seeking model focuses on how agents are faced with misaligned incentives and natural resource rents as a factor that increases the gap between the rich and the poor.

Resource curse is also seen in the aspect of patronage, creating different level of classes. These classes are referred to in literature as the political class and the elite class. The political class comprises of government officials that hold political powers, while the elite class are influential and affluently rent-seekers. Kolstad *et al.*, (2009) presented the patronage model which is defined as the use of public resources to secure political power. The patronage model focuses on political incentives and how decision by the political class and elite class are affected by natural resource. The basic underlying problem in patronage model is that increased natural resource rents offer political and elite class more opportunities and greater incentives to pay off political supporters to stay in power perpetually (Robinson *et al*., 2006). Patronage activities may lead to an increase in public expenditures and inefficiency in their use, and these activities influence the structure and composition of the public budget. Most public investments government embarked on have higher rent appropriation potential than other public expenditure (Kolstad *et al.* (2009). Consequently, these investments are most often unproductive, thereby hampering economic growth.

Torvik (2001) viewed that the concept of crowding out the manufacturing sector is explained by rent seeking. It has been observed that countries that depend on natural resources encourage greater number of entrepreneurs to engaged in rent seeking and reduce the number of entrepreneurs running productive firms. Torvik (2001) formulated a rent seeking model in attempt to explain the mechanism and reason natural resource lead to rent seeking. He asserted that with an increase in the primary factor, the value of an import quota increase more than that of productive production, pulling resources out of production and into rent seeking.

Empirical Literature

In the apparent relationship between resource and economic growth, the studies that found out negative relationship between resource and economic growth seems to be more than studies that found out a positive effect. Most commonly cited work in resource and economic growth relationship is by Sachs and Warner studies (1995; also 1997a, 1997b, 1999, 2001), who found a negative relationship between share of primary exports in GDP and economic growth between in all their studies. Although their cross country regressions indicate a negative relationship between natural resources and economic growth, the mechanism through which the resource curse operates is unclear without the attempt to test for cross-units dependence. The authors claimed to provide evidence of the negative effect of resource abundance on growth, but their measure of "abundance‟ (share of primary exports in total export which includes other export other than natural resources) can better be interpreted as a measure of "dependence‟ (the degree to which the economy depends on natural resources for its economic livelihood). Sachs and Warner's (1995) results are robust to alternative specifications of resource abundance, with similar results found by Sala-i-Martin (1997) and Sala-i-Martin Subramanian (2003). However, two of the alternative measures of Sachs & Warner test (share of mineral production in GDP in 1997 study and fraction of primary exports in total exports in 1999 study) are similar to their first measure in that they really capture resource dependence, not resource abundance nor neither resource endowment. Sachs and Warner's third specification (land area per person, 2001) indeed constitute a measure of resource abundance, but, since not all land is the same, it is a very imprecise measure of primary sector productivity, as the authors recognize.

Sachs and Warner (1995) confirmed that resource-abundant countries have the tendency to grow less than countries that are relatively resource poor. In addition, they established that economies with a high ratio of natural resource exports to GDP in 1971 tended to have low growth rates during the subsequent period 1971–1989. Similarly, Barbier (1999) showed that many low-income and lower middle-income economies that are highly resource-dependent experienced low or stagnant growth rates. Against this background, Brunnschweiler and Bulte (2008) argued that resource curse popularized by the cross-country study of Sachs and Warner is a ''red herring''. This is a bold claim given the huge literature on potential adverse effects of natural resources on growth. Interestingly, they based their critique on endogeneity of resource dependency, measured by resource exports. Brückner (2010) argued that nominal measure of natural resource dependence, the share of exports of primary products in GNP which Sachs and Warner and other prominent studies adopted, understated in growth regressions the negative link between natural resource dependence and per capita GDP growth. His study used purchasing power parity adjusted measure that yields an economically much larger negative relationship between per capita GDP growth and natural resource dependence than what has been suggested by the nominal measure. He concluded that the resource curse is a symptom of societies characterized by high levels of corruption and sluggish checks and balances on political decision making.

Boyce and Emery (2005) explained that resources curse focused on institutional and market failures caused by resource abundance. With a simple two sector model exhaustible resource model, they demonstrated that the correlation between growth and natural resource abundance can be negative in the absence of effective market and strong institutions. Their study showed whether resources are a curse or a blessing for an economy can only be determined by an investigation of the correlation between resource abundance and income levels. Using panel data for U.S. states, it showed that resource abundance is negatively correlated with growth rates but positively correlated with income. Hodler (2004) extensive research on natural resource curse presented fractional analysis of, majorly, Nigeria and Norway. His model thus predicted that natural resources lower incomes in fractionalized countries, but increase incomes in homogenous countries. Hence, the model predicted intensive fighting, weak property rights and low per capita incomes for such a fractionalized oil-rich country as Nigeria, as measured by the index of ethnic fractionalization, equal to 0.85. For such a homogenous country as Norway, his theoretical model supports that oil windfalls does not cause fighting and hence, property rights is effective and the oil windfalls a blessing.

Xu, Jelinga and Deng (2018) provided a robust of spatial serial correlation in economic growth. From their findings, institutional quality has an adverse effect on domestic and foreign countries, which showed a nonlinear relationship like a U-shape. This relationship can be likened to resource allocation effects for the institutional quality and demonstration effects for the growth. Moreover, resource endowment controls the relationship between institutional quality and economic performance, with the modified relationship following an inverted U-shaped pattern; this influence stems from investment expansion effects and passivation effects. The findings of Alpha and Ding (2016) supports the claim that natural resource export or endowment has contributed positively to economic growth in developing countries. The study demonstrated that the interaction between resource endowment and corruption has a negative effect on economic growth and a strong bi-direction relationship exist between resource endowment and economic growth.

Interrelationship and interdependence among countries can be a positive checks and means to avoid the resource curse (Bamiduro, 2012). For instant, Botswana and Gabon endowed with natural resources have a good human development index of 0.634 and 0.683 respectively far above Nigeria and Angola (also endowed with natural resources) human development index of 0.471 and 0.508 respectively. Nigeria and Angola can learn and adapt from Botswana and Gabon factors that contribute to their development. Bamiduro (2012) critically suggested that Ghana, who newly discovered oil, could reduce the risk of resource curse by learning from Nigeria's bitter experiences. He argued that Ghana can experience blessing if they avoid the syndrome of 'Nigeria Disease'.

In this regard, the choice of variable to capture the true effect of natural resources on economic growth is very important. The measurement of resource dependence by prominent studies has been proven to show negative correlation. Therefore, it will essential to adopt more appropriate measure of resource endowment. Cavalcanti *et al.* (2011) studies were able to found a positive effect of oil resource on economic growth by using the share of net resource earnings and oil reserves contribution to Gross Domestic Product (GDP) of cross-country study on economic growth.

Jojarth (2007) defined natural resource revenue as the total proceed derive from the sale of natural resource. He argued that resource rents is the outcome of resource revenue and the right metric to measure a resource-rich country's wealth because it considered the four elements of natural resources which are reserves (natural resource stock), production, export, revenue and cost. In this study, it was found out that oil production cannot give the true wealth accrued from natural resources but resource revenue. Wikipedia (2014 updated) stated that governments can collect a portion of resource revenue for the purpose of public finance. For example, resource revenue can be collected by a government as royalties or extraction fees in the case of resources such as minerals and oil and gas. Therefore, deriving the contributions of resource revenue to GDP, it will give the real situation that will measure the extent a country is endowed in a particular natural resource.

Brunnschweiler and Bulte (2008) examined the effects of natural resource abundance on economic growth using new measures of resource endowment (subsoil assets) and considering the role of institutional quality that act as a mechanism through which social capital can be attained. Their results show that resource exports are no longer significant while value of subsoil assets has a significant positive effect on growth, and also showed no evidence of negative indirect effects of natural resources through the institutional channel. Cotet and Tsui (2010) study examined oil endowment effect on some economic development indicators and found that oil endowment is indeed negatively correlated with infant mortality and positively correlated with life expectancy.

Kolstad *et al.* (2008) argued it out that resource endowment create problem to the economy (through patronage or rent-seeking) when institutions are bad, which reduces allocative efficiency and increase the tendency of income inequality in the economy. They strongly posited that rents come in many forms, as resources do and the facts remain that both theoretical argument and empirical studies suggest that not all revenue are negatively related to economic growth and development. So while revenue from certain natural resources are key to the problems faced by countries suffering a negative impact of resources, some countries enjoy the huge benefits created by these natural resource. Cotet and Tsui (2010) gave a good account of relationship that exists between natural resource and economic development. They contend that oil rent hinders economic development in which a unique panel dataset describing the world oil discoveries and extraction was used. Their study found a little robust evidence of a negative relationship between oil endowment and economic performance by relating it to Malthusian trap of population theory that states that population grows geometrically, while output grows arithmetically. Cavalcanti *et al.* (2011) found out that oil endowment, measured by oil revenue and oil rents, has significant positive relation with economic growth.

RESEARCH METHODOLOGY

Theoretical Framework

This study adopted the Benign perspective as the theoretical framework. As identified in the literature, this perspective has the view that natural resources had positive effect on economic growth (Alpha and Ding, 2016; Akinlo, 2012; Baghebo, 2012; Ross, 2006). The major channels through which resource endowed could have a positive relationship with economic growth are numerous. One, the huge revenues from natural resource enabled the SSA country governments of various natural resource producing countries to spend and invest massively on capital accumulation and long-term projects without depending on taxation. Revenues from natural resource sales, if properly utilized, could serve as a "big push" for economic growth and even economic development

(Akinlo, 2012). This channel is especially important for developing countries where dearth of capital often constitutes a major hindrance to growth and development.

Again, the huge foreign exchange earnings from resource exports, could equally assist in boosting the foreign reserves of the resource-endowed countries. The accumulation of foreign reserves can be seen as collateral which the resource endowed economies can use in attracting foreign investment (Dooley *et al*., 2003), thereby improving the economy. Moreover, such external holdings can be seen as a costly self-insurance strategy to smoothen vulnerability impacts of domestic and foreign shocks and to intervene in the foreign exchange market. Most of these natural resources possessed by these resource-endowed SSA countries can also serve as intermediate inputs to the rest of the economy through their specific by-products (Al-Moneef, 2006). This channel is critical to growth and development in the developing countries. For instance, many outputs of the petrochemical industries are crucial to the development of the manufacturing industries. Likewise, provision of electricity and other basic utilities at favourable prices is of considerable importance in the process of growing and nurturing the service and manufacturing sub sectors. Therefore, the model will be derived keeping the benign perspective in view and incorporate the effect of resource revenue contribution to GDP on economic growth (Baghebo and Atima, 2013).

Empirical Model

This study identified four main factors or variables that determine economic growth, widely used and empirically included as conditioning variables in growth regressions (Onyejiuwa, 2019; Olayeni and Tiwari, 2014; Cavalcanti *et al.*, 2011, Aregbeyen, 2003). These variables are initial per capita income, investment growth, government expenditure and population growth, and are classified as GRV model (growth rate variables). The study also identified variable that measures natural resource endowment, that is, natural resource export revenue contribution to GDP, which is incorporated into the growth regression to estimate the relationship between resource endowment and economic growth and are classified as GRNV model. Lastly, the study considered an indirect link of examining Dutch disease on economic growth through manufacturing output contribution to GDP variable in a situation resource curse is found. This is incorporated into the growth regression and are classified as GRMV model. Therefore, the following Models attempted to capture the long-run relationship of various sets of variables mentioned above in selected resource-endowed SSA countries. Presenting a Long-run growth functional relationships as:

GRV model: $grt = f(rgdp, gcf, gep, pgrt)$ (3.8)

GRNV model: $grt = f(rgdp, gcf, gep, pgrt, nrr)$ (3.9)

GRMV model: $grt = f(rgdp, gcf, pgrt, gep, man)$ (3.10)

where *grt* is economic growth rate per capita, *rgdp* is initial real income per capita (proxy by log real GDP per capita), *gcf* is Gross capital formation growth rate, *gep* is the government expenditure contribution to GDP, *pgrt* is population growth rate, *nrr* is natural resource export revenue contribution to GDP (calculated by SSA country specific natural resource export revenue contribution to GDP), *man* is manufacturing output contribution to GDP and *f* is functional notation.

For the purpose of statistical test, econometric model to capture (3.8), (3.9) and (3.10) is presented in the following sets:

CVN Set

$$grt_{it} = \alpha_i + \sum_{j=1}^{n} \delta_j^{cv} cv_{j,it} + \sum_{j=1}^{nn} \phi_j^{nrr} nrr_{i,t-j} + \mu_i + \in_{it} \qquad (3.11)$$

The CVN set represented a set of estimations of growth regression with four conditional variables as mentioned above and inclusion of natural resource revenue variable to determine the joint relationship of resource endowment with other growth factors on economic growth rate.

CVM set

$$grt_{it} = \beta_i + \sum_{j=1}^{n} \delta_j^{cv} cv_{j,it} + \sum_{j=1}^{n} \phi_j^{nrr} nrr_{i,t-j} + \sum_{j=1}^{n} \gamma_j^{nrr} man_{i,t-j} + \mu_i + \in_{it} \qquad (3.12)$$

The CVM set is specified to capture any evidence of resource curse if found in GRNV model. This will capture the effect of Dutch disease on economic growth in order to explain the resource curse where,

grt_{jt} is the real GDP per capita growth rate.

$cv_{j,it}$, which is the conditioning variables, consist of log of real GDP per capita, Gross capital formation growth rate, government expenditure contribution to GDP and population growth rate variables.

$nrr_{i,t}$ is the specific natural resource revenue contribution of GDP of selected resource-endowed SSA countries.

$man_{i,t}$ is the manufacturing output contribution to GDP.

δ_j^{cv} is the vector of coefficients of conditioning variables with a positive a priori expectations.

ϕ_j^{nrr} and γ_j^{nrr} are vector of coefficients of lagged order *j* for natural resource revenue contribution to GDP and manufacturing output contribution to GDP respectively; expected to have positive a priori expectations.

With β_j and α_i denoting country specific fixed effects for the two sets respectively that captured those unobserved variables (Peseran 2004). Moreover, any omitted variables that are either constant or evolve smoothly over time are also absorbed into the country specific fixed effects, μ_i. Furthermore, $\in_{it}$ absorb a number of different unobserved common factors that determine real income and it is normally distributed with zero mean and constant variance. The idea behind the per capita value to some variables is to capture growth in per capita terms that expressesed the economic growth.

DISCUSSION OF RESULTS

Descriptive Statistics of the data

Table 4.1 showed the statistical description of each of the variable under study. Since the time frame of the study is 1981 to 2016 with 14 cross sections, all the variables have a maximum number of 448 observations except those with missing values. The summary of the descriptive statistics gave information such as means, maximum, minimum and standard deviation. As reported in Table 4.1,

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all these variables are classified under four different categories which are: 1. Endogeneous variables; 2. Control variables; 3. Natural resource endowment; and 4. Dutch disease. For instance, first category which displays growth rate of real GDP per capita, the statistics showed that it grew on average of 0.55% with a standard deviation of 5.51. the third category which showed the natural resource endowment indicated that natural resource export revenue contribution GDP has an approximate average value of 25% and standard deviation of 17.1.

Table 4.1: Summary Descriptive statistics of the variable regressions

Variable	Description of Variables	Obs	Mean	Std. Dev.	Min	Max
GRT	Growth rate of real GDP	490	0.553	5.515	-35.471	18.672
LGDP	Log of real GDP	490	6.727	1.044	4.776	9.001
GCF	Gross capital formation	490	4.332	24.50	-83.624	80.953
GEP	Government expenditure (% GDP)	490	15.524	6.512	0.015	33.361
PGRT	Population growth rate	490	2.610	0.702	0.108	4.445
NRR	Resource export revenue (% GDP)	490	24.846	17.093	0.000	80.760
MAN	Manufacturing output (% GDP)	490	9.519	5.951	1.857	37.163

** the sample period ranges from 1981 to 2017.* Source: Author's calculation, 2018.

All the variables in the entire category show a good level of internal consistency as their mean values are within the value of minimum and maximum of each series. Also, Low deviation of all variables show how close each of the variable are close to their mean. Except gross capital formation growth rate that showed a considerable abnormal maximum and minimum values. This suggested that some SSA countries investment growth has not been consistence.

Unit Root Tests

Table 4.2 reported the IPS and the CIPS unit root tests. It was observed in the two tests that log of real GDP per capita and population growth rate was not stationary at level but stationary at first differenced. However, GDP per capita growth rate and investment growth rate were stationary at level in the two panel unit root tests. Natural resource export revenue percentage share in GDP showed non-stationarity at level and stationary at first differenced in CIPS test, but stationary at level in IPS tests. On the opposite, manufacturing output percentage share in GDP showed non-stationarity at level and stationary at first differenced in IPS test but, stationary at level in CIPS tests.

Table 4.2: First and Second Generation Unit Root Tests on Variables

Variables	IPS Test	Remarks	Pesaran's CIPS Test	Remarks
grt_{it}	-13.649***	I(0)	-4.293***	I(0)
$lgdp_{it}$	3.044		-1.081	
$\Delta lgdp_{it}$	-13.364***	I(1)	-4.659***	I(1)
gcf_{it}	-18.215***	I(0)	-5.672***	I(0)
gep_{it}	-2.376***	I(0)	-2.565***	I(0)
$pgrt_{it}$	5.737		-1.015	
$\Delta pgrt_{it}$	-18.919***	I(1)	-5.138***	I(1)
nrr_{it}	-1.768**	I(0)	-2.129*	
Δnrr_{it}			-5.357***	I(1)
man_{it}	-1.455		-2.604***	I(0)
Δman_{it}	-15.263***	I(1)		

Source: Author's calculation, 2018. **Notes**: Δ Symbolizes first difference of variable. Significant at *10%, ** 5% and ***1% levels for all statistics.

Cointegration Tests

The cointegration results showed that the null hypothesis of no cointegration is rejected at 1% level of significance in all 6 statistics of the Pedrono's residual cointegration tests as well as the the Kao residual based cointegration test. Therefore, the assumption that the long-run parameters for the variables in their levels are equal to the short-run parameters for the variables in their differences holds. This suggested that there is long-run equilibrium relationship that exist between the real GDP pre capital growth rate (grt) and log of real GDP per capita (lnrgdp), investment growth rate (igrt), government expenditures (gep) and population growth rate (pgrt) in GRV model. Also between the real GDP pre capital growth rate and log of real GDP per capita, investment growth rate, government expenditures (gep), population growth rate and natural resource export revenue percentage share in GDP (nrr) in GRNV model. Finally, between real GDP pre capital growth rate and log of real GDP per capita, investment growth rate, government expenditures (gep), population growth rate and manufacturing output percentage share in GDP (man) in GRMV model.

Table 4.3: Cointegration Tests

Statistics	GRV model	GRNV model	GRMV model
Panel rho	-4.961***	-3.815***	-2.031**
Panel PP	-12.692***	-13.388***	-13.607***
Panel ADF	-12.763***	-13.062***	-12.761***
Group rho	-3.925***	-2.569***	-0.703
Group PP	-14.041***	-15.807***	-17.975***
Group ADF	-14.038***	-14.513***	-13.891***
Kao	-6.597***	-6.268***	-6.248***

Source: Author's calculation, 2018. **Notes**: significant at *10%, ** 5% and ***1% levels for all statistics. GRV means growth regression variables, GRNV means growth regression with natural endowment variables and GRNMV GRNV means growth regression with manufacturing output variables.

Panel Fixed Effects Estimation Analysis

Table 4.4 reported the estimated results for GRV, GRNV and GRNMV models. Initial income per capita is positive and significant at 5% level of significance in all the sets regression reported which is in consonant with the a priori expectation. It implied that its effect on economic growth is sufficient to assert a convergence among SSA countries. Not only 1-unit increase in initial income per capita will cause an approximate 2 units increase in economic growth in all the sets, but also it is indicative that it has strong impact on SSA countries economic growth more than other variables. This suggested that initial income is a major determinant of economic growth which in line with existing studies such as Aregbeyen, 2003 and Rocha, 2010.

It is reported in the estimation results in Table 4.4 that investment growth rate is positively significant at 1% level of significance in all the sets regression. From the results, any 100% increase investment, growth rate will rise to 7%. It showed that investment is a positive factor to economic growth in SSA countries and revenue derived from resource endowment should be re-invested in profitable investment for sustainability. From economic point of view, investment is an additional capital outlay, which signified a first difference of capital stock and a dynamic consideration of capital stock on economic growth. Therefore, investment growth rate inclusion in the regressions has taken care of the dynamic effect of capital stock on economic growth. Government expenditures influence aggregate demand to achieve economic equilibrium through government engaging in economic activities. However, the results reported showed no significance relationship of government expenditures with economic growth. This suggested that most government expenditures in SSA countries is directed to non-economic activities or rather government engaged in non-profitable projects that will not improve the economy. Although Population growth rate has a positive relationship, it lacked significance in all the sets regression. Aregbeyen (2003) obtained similar results and relate it to negative initial human capital significant on economic growth. This suggested that high growing concern of unemployment rate in SSA countries irrespective of population increase over time.

The natural resource export revenue percentage share in GDP showed a positively significant relationship at 1% level of significance with real GDP per capita growth rate in the GRNV model. Perhaps, this results reflect the fact that SSA countries economic growth hinged on their resource endowment against the argument posited by Sachs & Warner (1995, 1997, 1999 & 2001) studies that resource dependence has negative relationship with economic growth. Calvacanti *et al.* (2011) obtained a similar result of positive relationship of oil endowment with economic growth among oil-rich countries. From these results, we disregard the notion of possibility of resource curse in SSA countries and assert that natural resource is a vehicle for SSA countries to achieve economic growth. The GRMV set is estimated to check if Dutch disease is evident in a situation resource curse is established. Though manufacturing output percentage share in GDP is positively related with real GDP per capita growth rate, it does not hold any ground because its effect is not

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statistically significant on real GDP per capita growth rate. Therefore, in the absence of resource curse in the estimation results, Dutch disease is irrelevant.

It is reported in Table 4.4 the measurement of goodness of fit with approximate value of 0.2 in all sets regression. It indicates that real GDP per capita growth rate is explained by the independent variables by 20%, which showed a relatively weak measurement of goodness of fit. The Durbin Watson value for GRV model reported 1.674 which falls between the tabulated value of d_L = 1.623 and d_U = 1.725 at 1% level of significance. This is also the case of GRNV model with Durbin Watson value of 1.708, while d_L = 1.613 and d_U = 1.735 at 1% level of significance. Therefore, it is inconclusive to accept or reject any evidence of positive first order serial correlation. The overall statistic, F-statistic is significant at 1% level of significance in all the sets regression. This implied that the overall model specified is significant.

Table 4.4: **Panel Fixed Effects Estimation Results**

grt_{it}	**GRV Model**	**GRNV Model**	**GRNMV Model**
Constant	-17.077** (8.166)	-19.943*** (8.130)	-16.861** (8.166)
$lrgdp_{it}$	2.372** (1.182)	2.423** (1.105)	2.437** (1.183)
gcf_{it}	0.071*** (0.010)	0.068*** (0.010)	0.070*** (0.001)
$gept_{it}$	0.038 (0.058)	0.050 (0.058)	0.053 (0.060)
$pgrt_{it}$	0.299 (0.436)	0.386 (0.432)	0.262 (0.437)
nre_{it}		0.085*** (0.027)	
man_{it}			-0.083 (0.073)
R2	0.201	0.219	0.203
F-stat	6.345***	6.688***	6.069***
DW	1.674	1.708	1.679

Source: Author's calculation, 2018. **Notes**: grt_{it} is dependent variable for all the sets. Significant at *10%, ** 5% and ***1% levels for all statistics; standard error in parenthesis. GRV model includes the growth regression variables, GRNV set include the growth regression variables with natural resource variable, GRMV set includes growth regression variables with manufacturing output variable.

Robustness Check with Difference GMM Approach

To check the robustness of our results, we also estimate our model using Generalized Method of Moments (GMM) estimator, first difference transformation approach. The results are reported in table 4.5. Sargan test which test the adequacy of the instruments used in the models confirm the validity of the instruments used. The null hypothesis of no first order serial correlation was rejected while we failed to accept the presence of second order serial correlation. Again the AR test showed significance of the lagged instruments variables. All these confirmed the appropriateness and fitness of the estimated models in this study.

The choice of the robustness check method is based on its validity to take care of endogeneity problems and of autocorrelation of the residuals across countries and over time. The lagged levels of all variables were used as instruments to take cognizance of the dynamic factors of independent variables on the dependent variable. The GMM results in Table 4.5 has similar results with the fixed effects panel data model in Table 4.4. However, the major difference is that initial income is not significant in the GRNV model. In this robustness check, resource endowment also showed a significant positive correlation with economic growth.

Table 4.5: Robustness Check with GMM Approach

grt_{it}	GRV Set	GRNV Set	GRNMV Set
Constant	-7.735 (4.798)	-6.188 (4.810)	-6.002 (4.451)
$lgdp_{it}$	1.164** (0.539)	0.738 (0.520)	.065* (0.533)
gcf_{it}	0.060*** (0.008)	0.059*** (0.009)	0.059*** (0.009)
gep_{it}	-0.037 (0.045)	-0.045 (0.039)	-0.018 (0.045)
$pgrt_{it}$	0.275 (0.875)	0.377 (0.891)	0.136 (0.841)
nrr_{it}		0.047** (0.020)	
man_{it}			-0.105** (0.035)
Sargan Test (P-val)	1048.57***	1069.19***	1063.30***
AR 1 Test (P-val)	-2.75***	-2.78***	-2.75***

Source: Author's calculation, 2018. **Notes**: grt_{it} is dependent variable for all the sets. Significant at *10%, ** 5% and ***1% levels for all statistics; standard error in parenthesis. GRV set includes the growth regression variables, GRNV set include the growth regression variables with natural resource variable, GRNMV set includes growth regression variables with natural resource and manufacturing output variable.

From the two long-run model specifications, that is, fixed effect panel data model and GMM estimator, the long-run equilibrium relationship of variables is attainable. We can assert that initial income per capita and investment growth will convergence at the long-run to have effect on economic growth positively. Furthermore, the notion of resource curse in resource endowed SSA countries is disregarded, and there is no basis to determine Dutch disease explanation of resource curse on SSA countries. Most SSA countries are predominantly a developing manufacturing sector unlike advanced countries that are well industrialized. It will be baseless to claim that SSA countries manufacturing sector is declining due to resource endowment. Therefore, we conclude that there is no basis to accept resource curse evident in resource endowed SSA countries, rather, revenue derived from resources should be re-investment to more profitable investment for future benefit and growth of the economy.

CONCLUSION

Relatively poor macroeconomic performance in SSA countries has been identified to suggest for resource curse in SSA countries when compared with advanced countries in some studies. But on the contrary, emerging countries need economic comparative advantage either to be endowed in human capital or in natural resource to achieve economic growth. The findings of the results further aligned with the Benign perspective that there is no form of negative long-run relationship between resource endowed and economic growth in resource endowed SSA countries under study. This implies that natural resource is a vehicle for economic growth in resource endowed SSA countries considered. SSA countries endowed in natural resources have over time increase in aggregate income and engaged in capital development. Therefore, it is essential for resource-endowed SSA countries to discover profitable investment in order to re-invested proceeds from natural resources into other form of renewable physical capital assets. The notion of resource curse which was not established could be avoided with sound economic policy for growth and development. The policy options recommended should be rigorously pursued to utilized all available natural resources and propel its industrial sector, to create a truly diversified economy where agriculture, agro-allied industries and the entire manufacturing sector would continue to contribute to the growth of the its economy and the welfare and prosperity of SSA countries.

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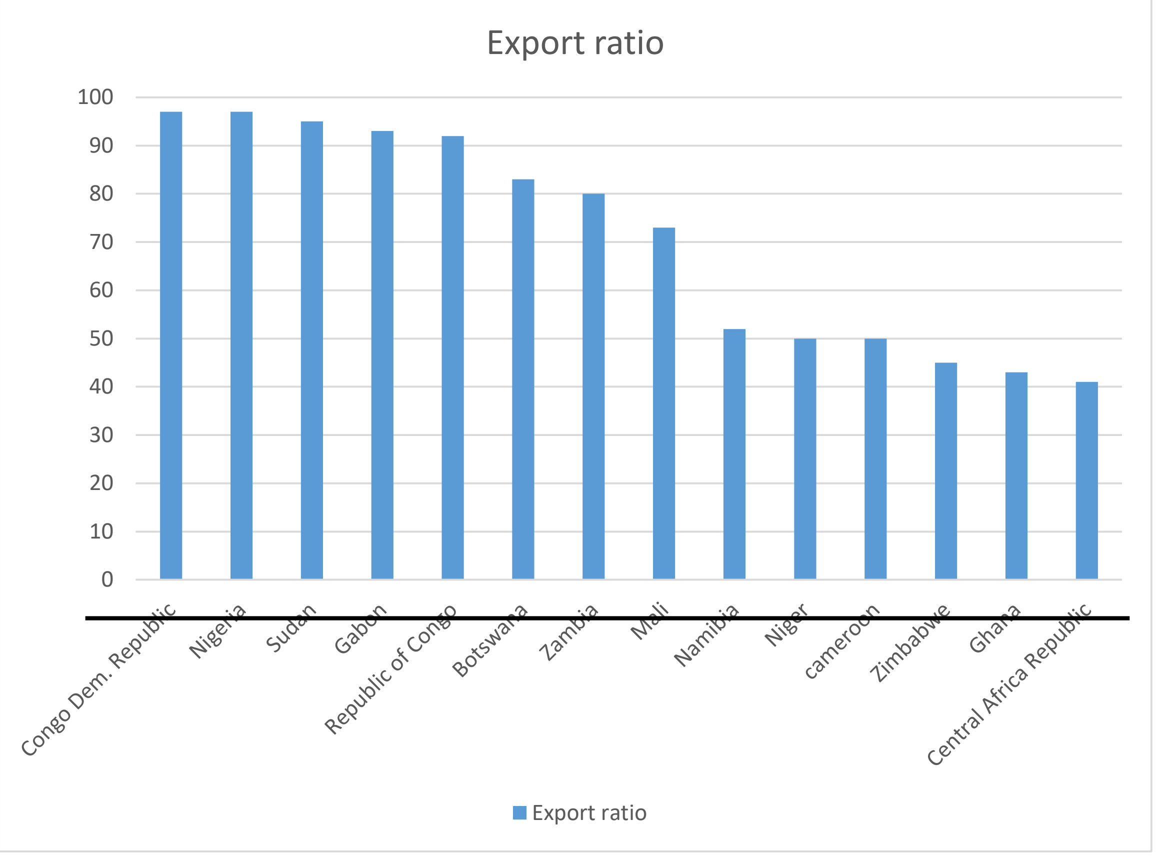
Appendix 1
Sub-Saharan African (SSA) Countries, Resource Exports Ratio



Source: IMF, African Department database (2013).