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Article

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Attaining Sustainable Growth in Nigeria: Any Role for Solid Mineral Development?

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Abstract *Using time series such as GDP per capita, solid minerals output, foreign trade balance, domestic interest rate, inflation, and gross domestic savings, for the period 1960-2015. the Linear Growth Regression model adopted for this study indicates that solid minerals positively impact on sustainable growth and is statistically significant. The study also found that solid mineral is highly significant but negatively related with foreign exchange due largely to illegal migration of mineral commodities across the borders of the country. In view of this, there is need for conscious inter-agency collaboration to track the volume of mineral resources illegally escaping the shores of the country without being accounted for. Besides, there should be more attention on developing the solid mineral sector to help insulate the economy from the vagaries of the present economic woes given the rising demand in solid mineral resources globally.*

Key words Solid minerals, sustainable growth, foreign trade balance, domestic interest rate, gross domestic savings, linear growth regression model

JEL Codes: Q01

1. Introduction

Nigeria is blessed with huge proven deposits of solid minerals widely distributed across the different geography, which was one of the major attractions for colonialism. It was with the proceeds of minerals mined that sustained the country while, colonialism lasted and after independence, solid minerals was one of the back-borne of the economy before oil was discovered in commercial quantities. Therefore, it would not be out of place to say that major industrial capital, the civil service etc. were acquired, built, maintained and sustained by minerals proceeds. It is of interest to note that Nigeria as at today is endowed with 44 different mineral types in varying commercial quantities found in more than 450 different locations (MSMD, 2016). It suffices to say that there is no state and or local government council in Nigeria that is not endowed with one mineral type or the other. In view of this, mining can be conducted in virtually all the states of the federation. Given the enormous deposits of these minerals, and with attention shifted towards developing them-one can imagine the multiplier effect it would have on job and wealth creation for the huge army of unemployed youths and poor Nigerians.

The utter neglect of the solid minerals is the microcosm of Nigeria's present level of underdevelopment, astronomically high unemployment and poverty level, youth restiveness and militancy, unpleasant rampaging of armed robbery, kidnapping and insurgency, and above all a miserable growth with nothing insight for the future and the generations yet unborn. With the launched of various economic reform programmes (ERPs) with the return to democracy in 1999, the solid mineral sector alone has the capacity to generate employment and wealth for over five million people (Transformation Agenda, 2014), currently the sector employs about 450,000 people directly and over 2million indirectly. This was evident with the over 12 percent (double digit) recorded in 2012-2013 (TA, 2014) a clear indication that the sector has the capability to insulate Nigeria from the vagaries of oil price shocks and volatility. According to the NEITI audit report on the solid minerals industry 2007-2010 over N2.21 billion was paid as royalty by operating companies, N51.4 billion as taxes by some companies/major players in the industry. Ground rents/annual surface rents payments attracted over N173.94 million in addition to N122.92 million in levies to the government (NEITI, 2013). The Central Bank of Nigeria (CBN) for the period under review as captured in the NEITI audit report, also reported that over 1,618 export transactions were conducted by 86 companies with a total revenue collection of N8.91 billion. The sector has a lot to offer if the right attitude and political will is redirected at revamping and developing the sector.

Empirical evidence reveals that Nigeria compares unfavourably with its sub-Saharan African neighbours in terms of GDP and revenue generated thereof. It ranges from 40 percent of GDP in Botswana to less than 1 percent in Nigeria; over 50 percent were generated in GDP for DR Congo, Namibia, Zambia and 12 other countries gained over 20 percent from solid

minerals exports in comparison with Nigeria's 0.4 percent in recent times (Eyre and Agba, 2007). The success story of Australia, South Africa, Botswana, Namibia, Canada etc. is that of a mineral economy especially solid minerals, as its contribution to national development and growth of these reference economies is monumental and wholesome as well as an attraction for other favourable human development indicators which rank such countries high and above Nigeria, as a result, Nigeria needs to wake up from its slumber and get to serious business to grow the economy on the path of sustainable growth.

There is no doubt, oil produces about 90 percent of Nigeria's exports earnings but the emerging trend according to Onodugo, (2013) indicates that the economy had been growing without job creation and poverty reduction as most of the wealth is concentrated in few hands, less than 1 percent of the entire population. The continuous dependence on crude petroleum over the years has dealt a dirty blow on the economy by not achieving the desired growth in spite of the huge revenues realized from oil, the country rather witnesses astronomical growth in poverty and unemployment. Poverty and unemployment have become so endemic in the country such that the number of people especially graduates who scramble for few jobs vacancies is so alarming (for example, the Immigration recruitment saga of 2012) sometimes leading to stampede and dead. Worse still, the petroleum sector has been disconnected from other sectors of the economy, therefore, offers no linkage of multiplier to the economy as a whole (Godwin and Ubong, 2015).

The future of Nigeria remains highly uncertain evident in increased poverty, unemployment, arm robbery, kidnapping, prostitution, persistent and endemic corruption, increase infant mortality, short/falling life expectancy and they like. In view of these, the number of Nigerians who now falls below US$2 per day poverty threshold had gone up astronomically. Yet the country is adjudged to be the largest economy in Africa and the 26th in the world (Suberu *et al.*, 2015). It is an emergency case now that Nigeria radically divorces from its dependence on oil and focus on other growth drivers especially the solid minerals which have a lot to offer. As opined earlier, these minerals are evenly distributed across the country; therefore, developing them implies even development of the country, increased capital formation and spread of employment thus, creating wealth and poverty reduction. Corroborating this clarion call Godwin and Ubong (2015) submitted that the adverse consequences of over dependence on oil necessitated the call to diversify the Nigerian economy away from oil petroleum towards the direction of non-oil exports. This is anchored on the premise that the non-oil sector, especially solid minerals, has great potentials to propel the Nigerian economy to the desired growth. It was in this light that Asu, (2013) as cited by Godwin and Ubong, (2015) contend that Nigeria needs to envision and evolve a country beyond oil or it perishes. It suffices to say that if the solid minerals were opportune to enjoy at least 1/3 percent attention given to oil, the National Vision 20:2020 would have been long achieved even before the target year, given the vast spectrum/coverage these minerals are spread across the length and breadth of the country with proven reserves in billions metric tonnes (MMSD, 2010; Nasiru, 2014). It is therefore imperative to determine if solid minerals development has a role to play in the attainment of sustainable growth in Nigeria.

2. Literature review

The impact of natural resources on economic growth has become topical among economists and policy makers, especially those dealing with the resource economy. To this end, mining industries have been viewed as key driver of the growth process, especially as lead sectors that engender economic expansion which can lead to higher levels of social and economic well-being. But in some countries, especially developing ones, the share of solid mineral contribution to the growth process has been negligible. As argued by Hlavová (2015), many of these economies are rich in minerals and at the same time one of the poorest. In support of this view, Akonji and Wakili (2013) contend that solid minerals in Nigeria account for only 3 percent of its GDP due largely to the influence crude oil resources. The domestic mining industry is grossly underdeveloped and this fuelled the importation of mineral resources that could be produced at home. An analysis of the relationship between the share of mineral resources in total export and economic growth by Hlavová (2015) did not reveal the relationship between the share of mineral resources in total export and economic growth in the category of mineral economies in the economies of Sub-Saharan Africa, only a very weak effect was found for other countries. In their study, Sachs and Warner (2001) confirmed the negative relationship between dependence of the economy on mineral resources and economic growth. They observed that no country with a share of mineral resources in total export more than 20 percent experienced significantly growth for two decades. The negative relationship between these variables is stronger if the country suffers from high income inequality, low quality of institutions, weak law enforcement and high corruption (van der Ploeg, 2011). Apart from confirming the negative relationship, Torvik (2009) further highlights the case of some industrialized countries whose success depend on factors such as political system, level of industrialization and natural resource endowments.

Some studies such as Cavalcanti *et al.* (2011) have however reached the opposite conclusion, when they investigated the relationship between crude oil production per capita and economic growth. But a sample of 53 countries from all continents has not demonstrated the negative impact of the volume of oil production on the economic growth. Maduaka (2014) analyzed the long-run relationship and also the importance of solid minerals and its impact to the economic development. Using the time series, it was found the linkage of solid minerals to the real sector steadily declined with a couple of structural breaks that over time. Although there was existence of a possible long-run relationship between solid mineral and economic growth, the estimated normalized level result found solid minerals to be positively responsive to growth which shows a feedback relationship between solid minerals production and growth. Similarly, Olalekan *et al*. (2016) did an empirical analysis of the contribution of mining sector to the economic development in Nigeria from 1960 to 2012 and the result presented revealed that the value of solid mineral have strong impact on economic development in Nigeria which supports the finding of Maduaka (2014).

Akonji and Wakili (2013) tries to expose the potentials in solid mineral resources as viable alternative to the petroleum sector that is volatile and unreliable as source of foreign exchange earnings for the country. The study was able to demonstrate that in partnership with federal, state or local communities the solid mineral sector can be fully developed and generate foreign exchange for country. Implied is that the solid mineral sector can be additional or alternative sources of revenue for the country but can only be achieved through diversification. Oliner and Sichel (2000), Jorgenson and Stiroh (2000) and Whelan (2000) findings support the assertion of improving economic growth through other means like solid mineral which they see as the main sources of revenue during periods of rebound. Other researchers like Young (1995) applied the same framework and discovered that the higher growth of output in the newly industrialized countries of East Asia is almost entirely due to rising in economic diversification which increases labour force participation and empowerment in labour quality in other sectors of the economy.

In the analysis of the role of solid minerals on economic diversification of Nigeria, Akongwale *et al.* (2013) employed both qualitative and quantitative approach and found evidence of the potency of solid minerals in contributing immensely to the growth process of the economy. Specifically, the result revealed that the development of the solid minerals could help combat poverty through job creation; especially, given its forward linkages with other sectors of the economy. Most importantly, it could help alleviate some of the problems associated with enclave nature of the economy that has for too long being vulnerable to fluctuations in global oil prices. The realization of these potentials need the strengthening of Nigeria's existing solid mineral development policy and creation of an enabling environment for the private sector to take the lead in the sector. In a related study, Adekeye (2010) revealed that there is much more to be gained from the development of mining sector and there is very much to lose from the non-development of the sector. This view was supported by Agba (2007) in his study on economic analysis of natural resources sustainability for the mining sector component in Nigeria. This can be achievable if the government provides the enabling environment for the private sector to investment massively in the mining sector. The outcome of the study by Godwin *et al.* (2015) further points to the fact that, Nigeria could tap from her largely untapped solid mineral potentials for sustained growth, both in the short run and the long run, although, it was indicated that this can be achievable through conscious effort at diversifying the economy, encouraging large scale industrialization of the non-oil sector of the economy, deepening technology in trade and investment, with much emphasis on the agricultural sector (Enoma and Mustafa 2011).

Roderick (2001) did a quantitative analysis on mining and economic sustainability and concluded that through appropriate responses to the challenges of mining and economic development, the benefits of mining can be sustained. Minerals wealth lives on, but in other forms such as educated and healthy people, efficient and fair social institutions, and man-made physical capital. Adeniyi *et al.* (2013), in their analysis on the legal regime for exploring solid minerals for economic growth in Nigeria, employed mainly descriptive approach. The study revealed that solid mineral remains crucial to economic development, wealth creation and poverty reduction in any nation. For this reason, it was recommended that Nigeria should adopt best practices and mechanisms to formalize and regulate mining explorations in order to experience sustainable growth. Employing Time Series Econometrics Model, Onodugo *et al.* (2013), found a weak and infinitesimal impact of non-oil export in influencing rate of change in the level of economic growth in Nigeria. The study argues that the situation reflects neglect of the non-oil sector and its capacity to create viable international trade windows. They blame the situation on the economy precariously leaning on crude oil with a fragile leg for several decades. The fallout of this is the fact that, the economy has been growing without job creation and poverty reduction and employment opportunities (Onodugo, 2013). This assertion agrees with the behaviour reflected in the trend analysis by Onodugo *et al.* (2013).

What all these findings reveal is that although the dynamics of the economy is at the whims and caprices of the price of oil, which for the most part, has been volatile and unpredictable, the solid mineral sector could be a force in achieving sustainable growth, which is key to solving social economic problems and guarantee sustainable and high-level welfare in the country.

3. Methodology of research

The model for this study draws from the Solow Growth model and the Linear-Growth-Regression model adopted by Capolupo (2008). The motivation for the choice of this model is that it clearly sets how variables correlate with growth. Accordingly, the relationship between endogenous and exogenous variables and economic growth can be stated in the form:

$$g_i = \beta_0 + \beta_1 y_i + \beta_2 x_i + \mu_i \quad (1)$$

Where: g_i denotes growth rate of real GDP per capita, y_i denotes the initial level of real GDP per capita, x_i is a vector of explanatory variables considered proximate determinants of economic growth and μ_i is the stochastic error term.

Following equation (1) and in line with the variables under consideration, the functional form of our model is specified below.

$$g_i = \alpha_0 + \alpha_1 y_i + \alpha_2 X_i + \mu_i \quad (2)$$

Where: g_i denotes sustainable growth, y_i is solid minerals, X_i is a vector of other intervening variables considered important determinants of sustainable growth.

To determine the effect of solid minerals on Nigeria's sustainable growth, the functional form of equation of the model is given as:

$$g_t = \varphi_0 + \varphi_1 lnMin_t + \varphi_2 inf_t + \varphi_3 lnGsa_t + \varphi_4 Dmrt + \mu_t \quad (3)$$

Where: g_t = Sustainable growth, Min_t = Minerals output as percentage of GDP, Inf_t = Inflation rate, Gsa_t = Gross saving as percentage of GDP, Dmr_t = Domestic interest rate.

To ascertain the impact of solid minerals on foreign exchange earnings in Nigeria, the functional form of the model is given as:

$$Fex = \alpha_0 + \alpha_1 lnG_t + \alpha_2 Rfm_t + \alpha_3 Dmrt + \varepsilon_t \quad (4)$$

Where: Fex_t = foreign exchange, G_t = is sustainable growth, Rfm_t = dummy variable proxy by reforms in the solid minerals sector indicating favourable investment climate, Dmr_t = cost of investment.

4. Results and discussions

The result of the impact of solid minerals on sustainable growth in Nigeria is presented in Table 1.

Table 1. Result of Impact of Solid Minerals on Sustainable Growth

Dependent Variable: logGDPPC

Variables	Coefficient	Std. Error	t-Statistic	Prob
Δ(logMin)	0.7188	0.3194	2.2506	0.0335
Inf	0.0018	0.0026	0.6792	0.5033
Δ(logGsa)	0.1412	0.0902	1.5656	0.1300
Δ(logDmr)	-0.2086	0.1572	-1.3269	0.1965
Constant	0.0012	0.0702	0.0171	0.9865
f-statistics	4.0774			0.0111

Source: Authors Computation

The above result shows that solid minerals have significant and positive impact on sustainable growth. It accounts for about 72 percentage change in GDP per capita. Specifically, a 1 unit increase in minerals output will accentuate about 0.72 percentage increase in sustainable growth in Nigeria. The result further shows that if the solid mineral sector is given the

required attention, it would significantly change the present economic woes of the country. Other variables like inflation and gross domestic savings also show a positive impact on sustainable growth with the exception of domestic trade, but they are not statistically significant.

The result of the impact of solid minerals on foreign exchange earnings is presented in table 2:

Table 2. Result of the Impact of Solid Minerals on Foreign Exchange Earnings in Nigeria

Dependent Variable: Logfex

Variables	Coefficient	Std. Error	t-Statistic	Prob
logMin	-1.1184	0.2314	-4.8340	0.0000
Δ(Dmr)	-0.0970	0.0900	-1.0780	0.2895
Rfm	4.1367	0.5883	7.0313	0.0000
Constant	13.7961	1.0254	13.4538	0.0000
f-statistic	30.8200			0.0000

Source: Authors Computation

From the result, the impact of solid minerals output on foreign exchange earnings is -1.12 percent approximately, with a t-value of -4.83 even though, it is statistically significant. In specific terms, a unit reduction in solid mineral output will reduce foreign exchange earnings by -1.12 percent. This clearly, buttresses the need for inter-agency collaboration for the effective and efficient implementation of the laws guiding the sector to help curb the menace of smuggling of mineral resources outside Nigeria without been accounted for. However, it is imperative to note that the long neglect the solid mineral sector suffers, the illegal migration of solid mineral resources through the porous borders are responsible for the paltry contribution of solid minerals to the country's foreign exchange earnings even though it is statistically significant.

5. Conclusions

This study has shown that solid minerals have significant role to play in achieving sustainable growth in Nigeria, although a reduction in solid mineral output reduces foreign exchange earnings. The study also reveals that institutional reforms in the solid mineral sector have a significant positive impact on foreign exchange. This is however achievable if government will adopt a revolutionary attitude towards the diversification drive it has been clamoring for and with the right political will shifted towards the growth of solid minerals. The policy implication of the findings is that the present mining ecosystem does not support the growth in foreign exchange, as the bulk of the mineral resources escaped the shores of the country without being properly accounted for. Arising from this, there should be inter-agency collaboration in the reforms effort of the government which should be vigorously pursued and sustained.

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