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NATURAL RESOURCE DEPENDENCE AND TAX EFFORT IN SUB-SAHARAN AFRICA

OLUWATOSIN ADENIYI [a], TERVER THEOPHILUS KUMEKA [b]
AND OLADIMEJI ALAGBADA [a]

[a] *University of Ibadan, Nigeria*
[b] *Dominican University, Nigeria*

The study investigated the empirical relationship between natural resource dependence and tax effort in 28 Sub-Saharan African countries, with data for the period 1996-2016. The findings indicated that in economies with oil rents, less efforts is invested on other non-oil-resource revenues. In these countries, trade openness deteriorates tax revenue efforts, consequently the bulk of government revenue come from the sale of crude oil. In contrast, economies without oil rents seem to channel more efforts towards non-oil-tax revenue. In these economies, our result showed that trade openness is an important improvement to tax revenues. We recommend that for economies with oil rents, proper tax record keeping and documentation of separate revenue sources be maintained. Conversely, other resources rent economies are also recommended to depend less on natural resources rents and grants from foreign donors; and maintain a policy of no non-tariff barriers to trade, except for health, social and security reasons.

Keywords: Oil Rents, Tax Revenue, Non-resource Revenue, Tax Efforts, Natural Resource Dependence
JEL Classification: H20, H27, O13, O55

1. INTRODUCTION

There has been heated debate in the extant literature that countries whose export basket is highly dependent on natural resource are particularly less reliant on non-resource tax revenue. These countries' economies rely on a few categories of export commodities for which prices on the world market are unpredictable. This instability in prices makes public revenue from these sources rather unpredictable. Furthermore, the mismanagement of abundant resources leads to crowding-out investments in other sectors (i.e. the well-known 'Dutch Disease').

To be certain that these debates corroborated empirical findings, a large body of

literature associates natural resource-abundance with growth and revenue volatility (von Haldenwang and Ivanyna, 2017; Crivelli and Gupta, 2014; IMF, 2013; Thies, 2010; Raddatz, 2007). Some studies link the high revenue volatility of resource-abundant countries to exogenous factors (external shocks) (von Haldenwang and Ivanyna, 2017), while others associate it with domestic factors, for instance, corruption, limited state capacity, general rent-seeking (Thies, 2010) and mismanagement of the Economy (Raddatz, 2007). For instance, the International Monetary Fund study (IMF, 2013) found that mining revenues in Zambia fluctuated between 5% and 18% of total government revenues between 2002 and 2011. At same time, relative to mining's contribution to gross domestic product (GDP), the average government revenue was less than one-fifth of the ratio used in foreign benchmark economies, including Botswana and Chile. Poor output in Zambia has been linked to political uncertainty and a significant lack of government competence in mining sector operations (Lundstøl et al., 2013).

Over the past decades, several factors that determine tax revenue efforts have been widely analyzed. The role of external debt in changing tax efforts in developing countries was discussed in seminal studies such as Tanzi (1987, 1992), whereas Leuthold (1991) examined the value of growth in the assessment of tax shares in Africa. As additional determinants of the tax efforts, these studies included the sectoral composition of output. Stotsky and WoldeMariam (1997) and Ghura (1998) confirmed Tanzi's finding that growth (per capita income) and import and agricultural shares explain half of the difference in tax efforts in developing countries but found no evidence that external debt played a role. Furthermore, studies by Gupta (2007), Davoodi and Grigorian (2007), and Thomas and Treviño (2013) support the view that the key determinants of tax efforts are per capita income, the share of agriculture in GDP, and the degree of trade openness. Foreign aid flows and institutional factors (especially corruption) have also been integrated as explanatory variables in these studies. Conceptually, resource revenue and international aid are a relatively inexpensive windfall that could become a replacement for non-resource revenue (tax efforts) (Bräutigam, 2000; Sisso and Beaumais, 2018; Mawajje, 2019), while low institutional efficiency can lead to tax evasion and (resource) rent-seeking (Tanzi and Davoodi, 1997; Collier, 2006; Masi et al., 2020; Abdelwahed, 2020) and rentier effect (Oyinlola, Adeniyi and Raheem, 2015). Although the effect of foreign funding in empirical studies is not generally negative (Gupta et al., 2003; Drummond, Daal, Srivastava and Oliveira, 2012; Chachu and Nketiah-Amponsah, 2021; Ishak and Farzanegan, 2020), the detrimental impact of corruption on revenue is more empirically confirmed (Tyburski et al., 2020; Drummond et al., 2012; Bornhorst, Gupta and Thornton, 2009; and Davoodi and Grigorian, 2007).

Additionally, favorable arguments for a well-diversified domestic (non-resource) tax base have been put forward. In view of the fact that natural resources in most countries are exhaustible in the near future, revenues produced from these resources appear to be highly volatile and this unpredictability is transferred to the budget in the absence of an adequate fiscal structure (Daniel et al., 2013). Moreover, with increasing domestic tax

efforts, the quality of public services and confidence in government is improving (Bergman, 2002; Leite and Weidmann, 1999). In addition, and also significantly, the opportunity for public scrutiny of government activities is steadily declining with low to no domestic taxation (Sachs and Warner, 1995a and 1995b; Sachs and Warner, 2001; Collier, 2006; Levi, 1998; Moore, 1998, 2007; Chachu and Nketiah-Amponsah, 2021; 2020; Ayala-García and Dall'erba, 2021). Empirical evidence has also shown that economies that are highly dependent on resource revenues are less democratic (Ross, 2001), face higher levels of corruption (Treisman, 2007; Abdelwahed, 2020), and have greater incentives to undermine their tax structures (Knack, 2009; Ayala-García and Dall'erba, 2021).

Accessibility to windfall revenue from resource rents will minimize governments' reliance on their taxpayers in underdeveloped nations. Incentives to expand their tax base, increase collection rates and eradicate inefficient exemptions and corruption have been weakened by the governments of such countries, especially the Sub-Saharan Africa (SSA) countries. There are important implications for other aspects of the standard of governance and transparency for the way government mobilizes public revenues. Taxation is a central element in public-government accountability relationships (OECD, 2008). Such concept is a main subject of the literature of the broad and increasing "resource curse" (e.g. Ross, 1999). Developing countries that benefit from oil and other rents from natural resources tend to be less democratic (e.g. Ross, 2001; Karl, 1997; Peck, 2021), more corrupt (e.g. Treisman, 2007; Leite and Weidmann, 1999; Oyarzo and Paredes, 2021), and less interested in building state tax collection or service capability (e.g. Knack, 2009). Collier (2006) calls "sovereign rents" resource revenues that produce unstable rent-seeking activity and appear to attract less scrutiny than other revenues from legislators and citizens (see Auty (2007) as well).

The pressure on available revenue sources are becoming urgently important, given the fact that there is increased need for governments of the SSA countries to provide social and physical amenities. In this context, this study seeks answers to the following questions: Does resource dependence influence tax effort in SSA? Do oil-rich economies in SSA deploy less effort in tax collection than their other counterparts without oil resources? Do other mineral resources economies in SSA channel more efforts towards tax collection? Do institutional factors (corruption, government effectiveness, political stability and rule of law) exert any influence on tax efforts in SSA? What policy implications arise from these issues?

In this paper, we study how resource dependence, economic and institutional factors and certain control variables influence tax effort (tax performance) using static and dynamic panel data techniques. The sample includes 28 countries from sub-Saharan Africa (SSA) over the period 1996 to 2016. The sample comprises least-developed countries (LDC) which therefore affords homogeneity to a certain extent. Crivelli and Gupta (2014), have done a similar study but they regarded all natural resources as being the same (oil and other mineral resources) and further considered control of corruption index as the only institutional quality. Our present paper uniquely distinguished itself by

disaggregating oil-rich economies and other mineral resources economies and further considered other economic as well as institutional qualities in order to investigate how they influence tax efforts in SSA countries. That is, we performed disaggregated regressions by splitting the sample into oil-rich economies (with oil rents) and other natural resources economies (without oil rents),[1] in order to explore whether the relatively more homogenous samples can have different results than the aggregated sample. This will also enable us to analyze whether tax effort (tax performance) in oil-rich countries can be different from those on other mineral resource countries.

Following The introduction, the paper is structured as follows. The next section presents a brief background and review of relevant empirical literature on studies for natural resources and tax revenue in the SSA and the world. Section 3 discusses the static and dynamic methodological issues employed in this study. It also includes a description of the various data used in the study. In Section 4 we present empirical results on the two subsamples (oil-rich and other natural resources economies). This includes estimations from the pooled-OLS, fixed effects, random effects, difference-GMM (for oil-rich economies) and system-GMM (for other natural resources economies). Section 5 concludes with some policy recommendations.

2. BRIEF BACKGROUND AND LITERATURE REVIEW

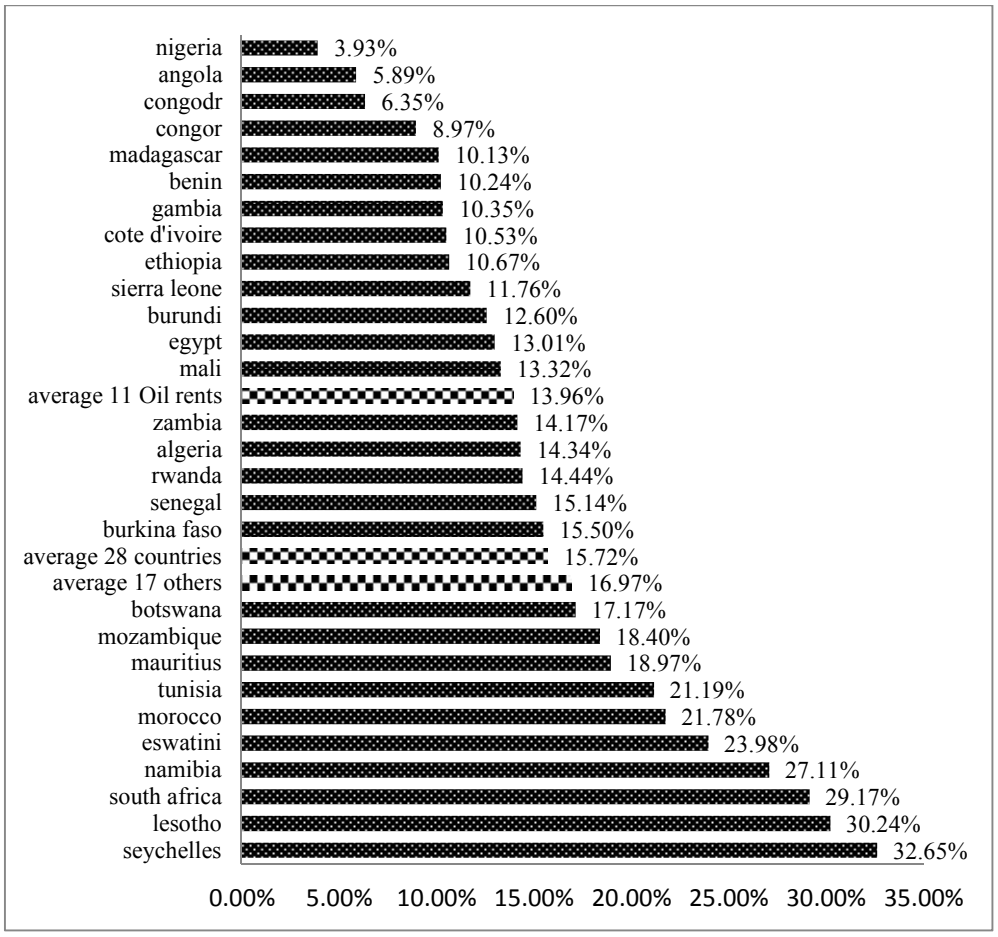
2.1. Brief Contextual Background

Most economies in Africa, especially SSAs are challenged with a considerable amount of shortfall to finance their investments, at an average of about USD230 in the coming years (Coulibaly and Gandhi, 2018). This is not unconnected to lower domestic savings rates, given the fact of the underperformance of tax revenue collection despite certain progress achieved. Domestic saving rates was around 15% to GDP on average in the region, which remains very low, compared to other regions in the world. According to IMF's April 2018 World Economic Outlook, it was projected that saving rates on the African continent will average 18% of GDP and investment rates with an average of 22% of GDP over five-year period. However, with the advent of COVID-19, this is very unlikely. An average of about 4% of GDP of external funding gap is expected given these projections. As a matter of fact, the funding gap is wider because economies at this stage of economic development require around 30% of GDP or more of investment rates for a long-term in order to attain economic transformation.

The move to make up the shortfall using foreign financing involves a reasonable amount of deficits in current account, resulting to balance of payment (BOP) crunches and macroeconomic instability. Therefore, for African economies to be able to fund its development agenda, it is imperative to improve domestic resources, through taxation.

[1] This disaggregation was informed on the basis of World Bank – World Development Indicators (WDI).

The importance of tax revenues cannot be overstated in domestic revenues mobilization. The initiatives to boost tax revenues have been the central focus and devotion by governments in Africa and other foreign development associates.[2]



Source: Authors' computation with data from ICTD / UNU-WIDER Government Revenue Dataset, 2019.
Notes: Large checker boards indicate average 11, average 17 and average 28 for economies with oil rents and other resources rents respectively.

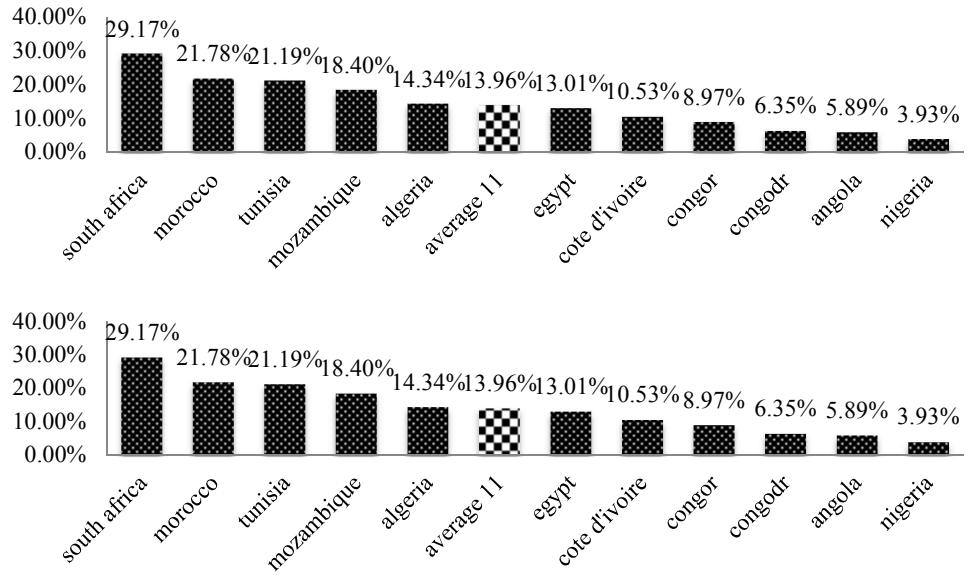
Figure 1. Tax-to-GDP Ratios (Total Tax Revenue Excluding Social Contributions as % of GDP), 28 Economies.

[2] A variety of such initiatives include the 2002 Monterrey Consensus, the 2011 Busan Agreement, the 2015 Addis Ababa Action Agenda, and the 2016 Forum for Tax Cooperation (Coulibaly and Gandhi, 2018); the 2015 Agenda 2063 adopted by the African Union.

Moreover, to enhance public spending, decrease dependence on international grants, and reduce foreign and domestic debts, the requirements to boost extra revenue through taxation becomes essential for least developed economies, especially SSAs. Hence, the need to improve the percentage of tax to gross domestic product (GDP) has become a fundamental policy goal in several SSA economies, backed by certain benchmarks. For instance, the 5 nations of the East African Community (EAC, 2013) set a benchmark of 25% of tax to GDP percentage (EAC, 2013). While the Economic Community of West African States (ECOWAS) set 20% as the lowest required percentage of tax to GDP for each country (Ndiaye and Korsu, 2014).

2.1.1. Tax Ratios for 2018

As of 2018, the average un-weighted percentage of tax to GDP for the 28 selected economies was 15.72%. Based on the distinctions in our study, the economies with oil rents resources and economies with other resources, the un-weighted average tax to GDP percentage was 13.96% for the 11 oil rent African economies and 16.97% for the 17 other resources rents African economies.



Source: Authors' computation with data from ICTD / UNU-WIDER Government Revenue Dataset, 2019.
Notes: Upper part for economies with oil rents and lower part economies with other resources rents. Large checker boards indicate average 11 and average 17 for economies with oil rents and other resources rents respectively. Congor stands for Congo Republic, congodr represents Congo Democratic Republic

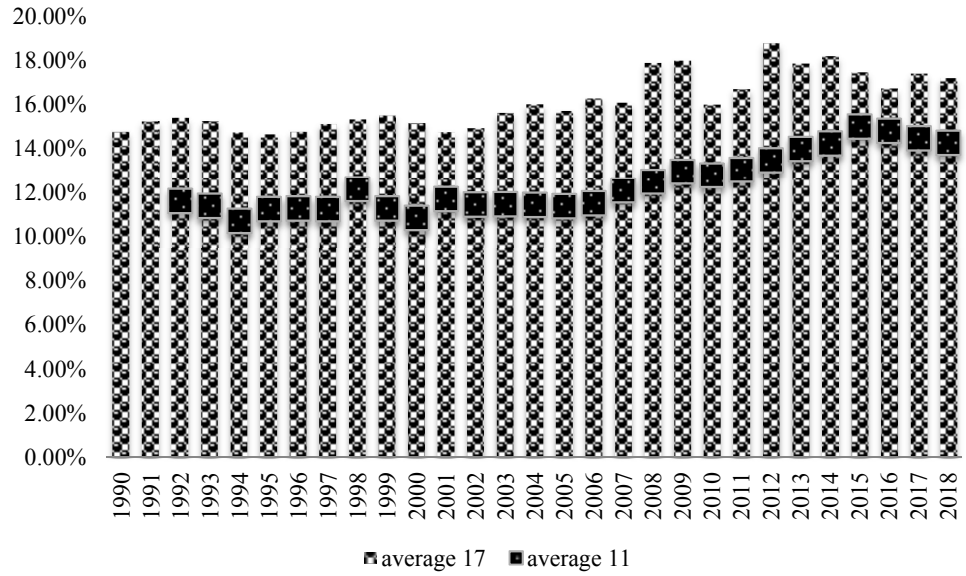
Figure 2. Tax Revenues as a Percentage of GDP, Most Recent Year.

In this study, the tax to GDP ratio employed is the total tax revenue, excluding social contributions and natural resource taxes as a percentage of GDP. All averages in Africa, the Africa 28 average, the 11 oil rents average and the 17 other resources rents averages are lower compared to the Latin American and the Caribbean (LAC) average (22.8%) and the Organisation of Economic Cooperation and Development (OECD) average (34.2%). As from the most recent year, tax to GDP percentages varied from around 3.93% in Nigeria to 32.65% in the Seychelles. As shown in Figure 1, more than 65% of the sampled economies have tax revenue to GDP ratios ranging between 10.0% and 22.0%. Five economies, Eswatini, Namibia, South Africa, Lesotho and Seychelles, have more than 22.0% of tax to GDP percentage.

Figure 2 shows the percentages of tax to GDP for both groups of countries as of 2018, that is, part 1 of Figure 2, 11 oil rents countries and part 2 of Figure 2, 17 other resources rents countries. It evident from the two figures that other resources rents economies have higher tax to GDP ratios (with an average of 13.96%) than the oil rents economies (with an average of 16.97%). This is an indication of likely higher tax efforts in countries with other resources rents than their counterparts with oil rents.

2.1.2. Percentage of Tax to GDP 1990 – 2018

From Figure 3, the selected African countries have made certain improvement in boosting non-resource tax revenues since the 1990s. In the case of oil rents economies, on one hand, on average, percentage of tax revenues to GDP increased from about 11.60% in 1992 to around 14.24% in 2018 on average. On the other hand, in the case of other resources economies, the average percentage tax to GDP ratio rose from 14.76% in 1990 to 17.16% in 2018. Several factors triggered the little improvement in tax collection. Coulibaly and Gandhi (2018) documented that around the 1990s and 2000s certain administrative and legislative reforms were carried out, which have aided in tax revenue collection (Kloeden, 2011; Fossat and Bua, 2013). Another factor that improves non-resource tax is the formation of semi-autonomous revenue agencies in African countries (Ebeke et al., 2016). However, even with the efforts put in place, tax to GDP ratio remains low, at around 11.60% for oil rents economies and at 17.97% for other resources rents economies, SSA have the lowest tax ratios in the world when compared to OECD economies, with around 24% tax to GDP ratio. Considering our two distinct samples, it is obvious that, on average, economies with oil rents have very low non-resource tax revenues in general; especially in Nigeria, Congo Democratic Republic and Angola tax revenues from non-resource components are roughly around 6% of GDP or less. This suggests widening the capacity to organize more non-resource tax revenue in these countries. The over dependence on resource revenues, especially crude oil, has aggravated the impact of volatile commodity prices on these countries. Conversely, economies like South Africa, Namibia, Lesotho and Seychelles recorded high successes with regard to non-resource tax revenues mobilisation, higher than even the OECD average (see ICTD, 2019; Coulibaly and Gandhi, 2018).



Source: Authors' computation with data from ICTD / UNU-WIDER Government Revenue Dataset, 2019.

Figure 3. Average Tax Revenues to GDP Ratios, 1990-2018.

2.2. Review of Relevant Literature

Lotz and Morss (1967) were the first to introduce the concept of tax effort with the interest to study international tax ratio, which was further applied empirically by Bahl (1971). Following the works of Stotsky and WoldeMariam (1997), tax effort[3] literature has undergone several amendments.

There is a significant volume of tax effort literature that analyses the tax output across various countries. The determinants of government revenues in developing countries have considered considerable amounts of these empirical works essential. The effect of corruption, voice and accountability on tax revenues in developing countries and high-income countries was examined by Bird et al. (2008). The relationship between international aid, exports of natural resources and the efficiency of tax systems for

[3] The indicator of the degree to which a country has used its taxable ability is the tax effort. This is called a static tax performance indicator since it reveals details about a country's taxable ability at any point in time (usually every year) in relation to actual tax performance. To obtain the tax effort, a method is generally used whereby the real tax ratio is divided by the expected value of the tax ratio. Thus, the expected tax ratio is the taxable ability measure. The accuracy of a country's tax effort is therefore largely dependent on the accuracy of the model used to describe the tax ratio (Ndiaye and Korsu, 2014).

developing economies was discussed by Knack (2009). Mahdavi (2008) examined the influence on tax revenues of a number of factors, including demographic, gender and political variables. Agbeyegbe et al. (2006) examined the effect on tax revenue in Sub-Saharan Africa of trade liberalization and exchange rate shifts. The effect of international aid, either its direct or contingent effect, on tax revenues is being studied by an increasing number of studies (Clist and Morrissey, 2011; Prichard et al., 2013; Yohou et al., 2016; Crivelli and Gupta, 2016; Ackah-Baidoo, 2016; Alsharif et al., 2017; Arvanitis and Weigert, 2017; Ayelazuno, 2014; Badeeb et al., 2017; Ben-Salha et al., 2018; Bergman, 2002; Sala-i-Martin and Subramanian, 2013; Van Alstine et al., 2014: Olanya, 2015; Parcero and Papyrakis, 2016; Castro and Ramírez, 2014; Cockx and Francken, 2016; Lawer et al., 2017; Wigley, 2017).

The degree to which government revenue is influenced by external shocks was discussed by von Haldenwang and Ivanyna (2017) and whether these effects are different for resource-rich countries compared to non-resource-rich ones. They were especially interested in the fate of poorer countries, as it was believed that it would be more difficult for these countries to enact the required policies to mitigate the impact of shocks. The elasticity of tax revenue was calculated with regard to terms-of-trade shocks, based on data from the International Centre for Taxation and Development (ICTD) Government Revenue Dataset for 1980-2010. They find that revenue is more vulnerable to such shocks in resource-rich countries. Interestingly, it is above all the wealthy nations that seem to be more negatively impacted. In addition, in the 2000s, resource-rich countries became less fragile relative to previous decades. Finally, they concluded that the general institutional features of a country might not always reflect the standard of its natural resource management.

Ndiaye and Korsu (2014) concluded that revenue collection is critical in any economy's fiscal operations. The study examined the tax revenue determinants and constructed a tax effort index for the different countries in the region of the Economic Community of West African States (ECOWAS). In order to provide guiding principles for fiscal policy operations, such an investigation provides information on those countries which operate their tax systems below capacity and those which, given the nature of the economies, operate above their tax potential. The methodology used was to estimate the stochastic frontier tax functions for direct taxes, indirect taxes, trade taxes and total taxes (with and without natural resource-related taxes) for all ECOWAS countries, including five non-ECOWAS sub-Saharan African countries, over the period 2000 to 2010. These countries' tax efforts were calculated from stochastic frontier estimates for the period from 2000 to 2010. The results of the tax effort estimate show that all ECOWAS countries, albeit with variations in magnitude between tax types and countries, are below their tax capabilities. In addition, Guinea Bissau was heavily taxed in UEMOA and Nigeria in WAMZ (more than 75% between 2000 and 2010), where natural resource-related taxes are included in total tax revenue, but the exclusion of natural resource-related taxes from total tax revenue limited the country's tax efforts to 25% and 7%, respectively. This rapid decline in overall tax revenue, when natural

resource-related taxes are included, means that these nations rely heavily on their endowment of natural resources. This may mean that the key sources of revenue for these countries are highly dependent on their natural resources. Other countries that were high tax-effort countries with the inclusion of taxes relating to natural resources remained high tax-effort countries with the exclusion of taxes relating to natural resources.

Knack (2009) hypothesized that tax benefit revenue from foreign aid or exports of natural resources may weaken the incentives of governments to design or sustain effective tax systems. Using cross-country data for developed countries and the World Bank's 'revenue mobilization performance' metric, the negative effects of international aid on the quality of tax systems are robust in correcting possible reverse causality, sample shifts, and alternative methods of estimation. Natural resource revenues are often correlated with lower-quality tax systems, but the findings are somewhat sensitive to the choice of measures of resource dependency and to a few severe data values. Disaggregating by form of resource, fuel export revenues are found to be more closely correlated with inefficient tax systems than export revenues from metals and minerals.

Morrissey et al. (2016) discussed revenue vulnerability to external shocks using export composition to capture economic structure and to distinguish economies by income levels, resource endowments and political regimes. The study found that countries with lower incomes are susceptible to shocks, especially in terms of trade (associated with the greatest loss of revenue). In addition, the findings showed that democratic regimes appear to be less vulnerable than non-democracies to revenue losses due to shocks, while revenue is more vulnerable to shocks in resource-rich countries (excluding natural disasters) than in non-resource-rich countries. Finally, a negative relationship between manufacturing exports and revenue in lower-income countries has been found to exist. This negative relationship between manufacturing exports and revenue may be rooted in the low added value and efficiency of manufacturing goods. Profits that are the source of the corporate tax base are either low (and/or difficult to tax, particularly if they are received by multinationals) or because salaries (the income tax base) are low in order to preserve global competitiveness, resulting, in either case, to lower income at the tax rates defined.

Thomas and Treviño (2013) suggested that for many resource exporting Sub Saharan African economies, high natural resource prices in recent years have resulted in substantial rises in fiscal revenue. However, these countries are advised to rely on other types of taxation to help finance public spending because of the uncertainty of this source of revenue. The paper further found evidence suggesting that a higher resource revenue-to-GDP ratio negatively affects non-resource revenue. In resource-rich countries, the lower intake of non-resource taxes is associated with higher levels of corruption in those countries, indicating that poorer institutions, as argued in the literature, influence non-resource earnings through incentives for tax evasion and/or broad tax exemptions.

Briefly, there is sizable extant literature regarding natural resources and tax effort in

developing countries especially SSA. Most of the studies in literature focused on or are carried out at the aggregate level by summing all countries together in one group or treating natural resources the same (Coulibaly and Gandhi, 2018; Damette and Saghir, 2018; Yohou, and Goujon, 2017; Morrissey et al., 2014; Thomas and Treviño, 2013; Lundstøl et al., 2013; Fossat and Bua, 2013; Bird et al., 2008; Gupta, 2007; Stotsky and WoldeMariam, 1997; among others). Further, even those that split the sampled countries are either done at geographical level or income level (low, middle or high-income levels), (e.g., Benedek et al., 2012 among others) and by political regimes (democracy or non-democracy), (e.g. see Morrissey et al., 2016 among others). Knack (2009) on the other hand disaggregated natural resources by type into revenue from fuel exports and revenue from metal and Ore exports. However, to the best of our knowledge or awareness, no study has attempted to disaggregate natural resources into oil and other mineral resources. This constitutes the gap the study intends fill. This study is a novel attempt to segregate natural resources into oil-rich and other natural resources economies in SSA and to investigate whether economies with oil resources make less tax efforts than economies with other mineral resources. For the purpose of robustness, we also employed three different proxies for tax efforts (tax revenue, taxes on goods and services and taxes on income, profits and capital gains) to enable us examine whether more efforts are geared towards collecting certain taxes than others.

Therefore, the present paper deviates from existing studies in the literature by focusing on SSA countries and split the sample into oil-rich (economies with oil rents) resource and other mineral (economies without oil rent) resource countries, in order to explore whether the homogenous sub-samples can have different results than the aggregated sample.

3. THE ECONOMETRIC APPROACH[4]

Our current study employed the process of panel data since our samples include data over time and across markets. Therefore, we used four panel methods to investigate the relationship between the exogenous series and the measures of tax revenues, these include pooled ordinary least squares, fixed effects, random effects and the generalized method of moments (GMM).

3.1. Benchmark Model

A general regression equation is the first model implemented as follows:

$$TR_{it} = \sigma_0 + \sum_{q=1}^{m} \varphi_q X_{qit} + \mu_i + \upsilon_{it}, \quad (1)$$

[4] The authors would like to thank the anonymous referee(s) for the valuable suggestions that improved this section of the paper.

where TR or the predictor variable is tax revenue, X is a vector of economic and institutional variables that determine tax revenues, φ is a vector of coefficients to be calculated, μ are the unobservable individual effects, particular to each country. The error term is assumed to satisfy white-noise assumptions, that is independently and identically distributed with zero mean, constant variance σ^2 and serially uncorrelated, which is denoted as $u \sim IID(0, \sigma^2)$. The parameter σ_0 accounts for country specific differences and allows the intercept to vary for each country. The subscripts i and t denote country and year respectively.

The pooled OLS technique is the most required in the case where country-specific and time-specific effects are non- existence. Whereas, on the other hand, in the fixed effect method, the constant terms for each country are allowed to vary, however, restrictions are placed on the slope parameters to be fixed across all countries and periods, contrary to the fixed effects technique, the argument supporting the random effects is the assumptions that variation across countries are random and uncorrelated with the exogenous series incorporated in the model. In order to choose the model that best suits our analyses between fixed effects and random effects; we implemented the Hausman specification test (Hausman, 1978).

We provide a description of the models of estimation below:

$$TR_{it} = \sigma_0 + \varphi \sum_{q-1}^{m} X_{qit} + \upsilon_{it}, \tag{2}$$

$$TR_{it} = \sigma_{0i} + \varphi \sum_{q-1}^{m} X_{qit} + \mu_{it}, \tag{3}$$

$$TR_{it} = \sigma_0 + \varphi \sum_{q-1}^{m} X_{qit} + \upsilon_i + \mu_{it}, \tag{4}$$

where σ_0, σ_{0i} and μ_{it} are the constant term, the intercept of for the ith country and the random error term for the ith country at time t respectively. Equations (2)-(4) represent the pooled OLS, fixed effects and random effects respectively. Dynamic panel model is presented next.

3.2. Dynamic Methods

For two key purposes, this econometric approach is important to our research. First, it is important to introduce a lagged dependent variable into the model in order to explore the impact on current values of past tax revenue values and, in this way, to test for the effect of persistence. Secondly, it is important to explore the possibility that the issue can occur due to the misspecification of the model in order to deal with autocorrelation; to be precise, due to an omitted lagged dependent variable.

In this framework, Equation (1) is extended and transformed by adding a lagged dependent variable into a dynamic panel data model (DPDM) as follows:

$$TR_{it} = \sigma_i + \bar{\omega} TR_{it-1} + \sum_{q=1}^{m} \varphi_q X_{qit} + \mu_i + \upsilon_{it}. \tag{5}$$

Nevertheless, the inclusion of a lagged dependent variable introduces a source of persistence overtime namely correlation between the right hand regressor TR_{it-1} and the error term υ_{it}.

3.3. The Generalized Method of Moments (GMM) Estimation

Equation (5) is estimated by employing the GMM, for DPDMs, as suggested in Arellano and Bond (1991) and Arellano and Bover (1995). Primarily, country-effects μ_i are removed by expressing the dynamic equation in first differences as follows:

$$TR_{it} - TR_{it-1} = \bar{\omega}(TR_{it-1} - TR_{it-2}) + \sum_{q=1}^{m} \varphi_q (X_{qit} - X_{qit-1}) + (\upsilon_{it} - \upsilon_{it-1}). \quad (6)$$

On the basis of the following standard moment condition:

$$E\left(TR_{i,t-s}\, \Delta\upsilon_{it}\right) = 0 \text{ for } t = 3, \ldots, N \text{ and } s \geq 2,$$

that is, lagged levels of TR_{it} are uncorrelated with the first difference, the method uses lagged endogenous variables as instruments to control for likely endogeneity of the lagged variable, reflected in the correlation between this variable and the error term in the transformed equation.

Blundell and Bond (1998) contended that the GMM estimator obtained after first differencing has been found to have large finite sample bias and poor precision. They attribute the limitations of the estimator to the problem of weak instruments, as they assert that lagged levels of the series provide weak instruments for the first difference.

In order to improve the properties of the standard first-differenced GMM estimator, they justified the use of an extended GMM estimator, on the basis of the following moment condition:

$$E[(\Delta TR_{it-1}(\mu_i + \upsilon_{it})] = 0,$$

that is, there is no correlation between lagged differences of TR_{it} and the country-specific effects. The method therefore uses lagged differences of TR_{it} as instruments for equations in levels, in addition to lagged levels of TR_{it} as instruments for the equation in first differences. This extended method is known as the system GMM estimation (sys-GMM). It encompasses a regression equation in both differences and levels, each one with its specific set of instrumental variables. The sys-GMM[5]

[5] We employed diff-GMM in analyzing the sub-sample with oil resource rents because it provided a better statistical significance. That is, correct AR(1) and AR(2) and the best Hansen and Sargen specification results. While for the group with other resource rents, the sys-GMM was deployed.

estimation not only improves precision but also reduces finite sample bias.

3.4. Data

In this present paper, we focus on natural resources rents and tax efforts in sub-Saharan African countries. The dataset used for this study includes a balanced panel of 28 SSA countries[6] divided into 11 economies with oil rents and 17 economies endowed with other mineral resource rents (without oil rents). The ground on which economies were classified into the two subsamples was based on whether a country has oil rents as a percentage of GDP or otherwise, as indicated on World Development Indicators (WDI). The sample covers the period 1996-2016 and was determined by the availability of data on the World Governance Indicators (WGI). Our data were extracted from World Bank's World Development Indicators (WDI, 2017) and WGI. Tax efforts/revenues (dependent variables)[7] comprise of taxes on goods and services (current LCU), taxes on income, profits and capital gains (current LCU) and tax revenue (current LCU). Explanatory variables include oil rent (% of GDP), grants and other revenue (current LCU), revenue excluding grants (current LCU), total natural resources rents (% of GDP), GDP and trade openness (exports and imports relative to GDP). The variables for governance indicators comprise of control of corruption, government effectiveness, political stability and the rule of law. The scale of the indices vary from -2.5 (weak) to +2.5 (strong) control of corruption, government effectiveness, political stability and rule of law abidance. In addition, we perform cubic spline interpolation where there are missing data for the WGI. Summary statistics are provided in Table 1 for the two sub-samples (oil-rich and other resource rents economies).

4. DISCUSSION OF FINDINGS

In this study, we investigate tax efforts in 28 SSA countries for the period 1996 to 2016. In preparing our data based on the review of literature above, we discovered that all SSA countries have at least one natural resource. Therefore, as stated earlier, the present study deviates from existing studies in the literature (such as von Haldenwang and Ivanyna, 2017; Morrissey et al., 2016; Ndiaye and Korsu, 2014; Thomas and Treviño 2013; Knack, 2009 among others). We then focused on SSA countries and split the sample into oil resource rents economies (with oil rents) and other resource rents economies (without oil rents), in order to explore whether these homogenous samples can have different results than the aggregated sample.

[6] See Appendix Table A1 for list of countries.

[7] The choice for multiple dependent variables was informed by the need to test for different impact of the independent variables on different sources of taxes. We employed three different proxies for tax efforts to enable us see whether efforts are geared more towards collecting certain taxes than others.

Table 1. Summary Statistics: 1996 - 2016

Panel A: Oil-rich Economies (with oil rents)					
Variables	Obs	Mean	Std. Dev.	Min	Max
GDP	231	28.147	1.789	24.250	31.876
Grants	231	25.155	2.390	16.760	28.804
Oilr	231	12.033	16.336	0.000	60.452
Rex	231	26.503	2.086	18.871	29.406
Taxr	231	26.007	2.018	18.742	29.322
Taxg	231	24.772	1.939	17.042	28.494
Inctax	231	25.115	2.137	17.832	28.898
Totr	231	17.814	16.390	0.306	62.693
Cor	231	-0.681	0.541	-2.058	0.761
GEF	231	-0.635	0.647	-1.974	0.877
POS	231	-0.915	0.804	-2.989	0.590
Rlaw	231	-0.750	0.602	-2.206	0.240
Top	231	0.926	1.256	0.003	7.677
Panel B: Other mineral Resource Economies (without oil rents)					
Variables	Obs	Mean	Std. Dev.	Min	Max
GDP	357	26.425	2.224	22.145	29.999
Grants	357	23.084	2.619	17.556	27.900
Oilr	357	24.527	2.297	20.163	28.593
Rex	357	24.372	2.348	19.932	28.568
Taxr	357	23.147	2.710	17.172	27.590
Taxg	357	23.044	2.316	18.305	27.558
Inctax	357	8.004	7.745	0.001	40.550
Totr	357	-0.246	0.570	-1.443	1.250
Cor	357	-0.429	0.584	-1.727	1.036
GEF	357	-0.119	0.838	-2.514	1.189
POS	357	-0.316	0.568	-1.728	1.057
Rlaw	357	0.778	0.614	0.061	4.329

Source: Authors' computation.

Note: GDP is gross domestic product, Grants is grants and other revenue, Oilr is oil rents (% of GDP), Rex is revenue excluding grants, Taxr is tax revenue, Taxg is taxes on goods and services, Inctax is taxes on income, profits and capital gains, Totr is total natural resource rents (% of GDP). Cor is control of corruption, GEF is government effectiveness, POS is political stability, Rlaw is the rule of law and Top is the trade openness (exports+imports)/GDP. GDP, Grants, Rex, Taxr, Taxg and Inctax are in their natural logarithms, while all other variables are in level.

4.1. Results for SSA Economies with Oil Rent

Our results start with the conventional ordinary-least-squares (OLS) method pooling all the observations and assuming that $\sigma_i = \sigma$ (i.e. a common constant). For the purpose of this study, we used three different proxies for tax efforts in SSA countries, which are tax revenue (taxr), taxes on goods and services (taxg) and Taxes on income, profits and capital gains (Inctax). Table 2 shows the results obtained from the OLS specification for the three dependent variables. The estimations indicate that for Grants

and Oilr, both have negative and significant coefficients in all three models; this is consistent with the hypothesis that the accessibility to grants and oil revenue discourage tax efforts in the SSA economies. The magnitudes are higher for grants than for oil rent. An increase in grants by one percentage point will give rise to a decline of 0.344, 0.347 and 0.294 percentage points in Taxr, Taxg and Inctax respectively, while a rise on oil rent by a percentage point would generate a fall in tax efforts by a percentage point of 0.025 for Taxr, 0.053 for Taxg and 0.012 for Inctax. Revenue, excluding grants (rex) and total natural resources rent relative to GDP, (Totr) has positive and significant impact on all the three dependent variables. The impact is more than one for one in rex and very low for Totr. That is, one percentage point increase in rex will generate more than one percentage points of 1.36 for Taxr, 1.50 for Taxg and 1.25 for Inctax in tax efforts. A percentage point rise in Totr will lead to 0.007, 0.031 and 0.006 percentage points in Taxr, Taxg and Inctax respectively.

In the case of economic growth (GDP), it has negative and significant impact on Taxr and Taxg, while it positively influenced Inctax and is significant at 10% conventional level. This means that a percentage point increase in GDP will lead to a 0.073, 0.37 percentage points fall in Taxr, Taxg and a 0.074 percentage point increase in Intax respectively. The results for trade openness (Top) as shown in Table 2 are ambiguous. Top has positive and siginificant impacts on Taxr and Inctax while it negatively and significantly affects Taxg. In terms of the magnitude of impact, a percentage point increase in Top will give rise to an improvement in Taxr and Inctax by 0.047 and 0.135 percentage points respectively, while it results to a fall in Taxg by 0.147 percentage point. Similar to the outcome for Top, the entire governance indicators exhibit mixed relationship with the three proxies for tax efforts in SSA countries. First, control of corruption (Cor) and political stability (POS) have a positive impact on Taxr, Taxg and a negative influence on Inctax with 1% level of significance in all the models except for Taxr. Government effectiveness (GEF), on the other hand, posed a negative and significant relationship in both Taxr as well as Taxg models and a positive and significant relationship for Inctax. Rule of law (Rlaw) has a negative and significant impact on Taxr and positive and insignificant impacts on Taxg and Inctax.

However, because of the major weaknesses of OLS, which assumes that the constant value of the countries is the same and it does not control for country specific factors, we employed alternative methods. In order to resolve these issues, we performed the fixed effect (FE) and random effect (RE) models that incorporate the specific nature of individual countries. The results are presented in Table 3. It is more suitable to specify the FE and RE than the OLS specification. The Hausman (1978) test is deployed to enable us choose between the FE and RE specifications. The null hypothesis that is fundamental to the test is that the explanatory variables and the individual specific random disturbance term are uncorrelated. If the chi-squares distribution of the null hypothesis is rejected, then the RE estimators are biased and the FE model is chosen. As indicated in Table 3, the results from the Hausman test showed that the RE estimates are inconsistent and the FE would be more suitable.

Table 2. Ordinary Least Squares Results for Oil-rich SSA Economies

Dependent variables	Taxr	Taxg	Linctax
LGDP	-0.073***	-0.367***	0.074*
	(0.022)	(0.034)	(0.041)
Lgrants	-0.344***	-0.347***	-0.294***
	(0.031)	(0.048)	(0.057)
Oilr	-0.025***	-0.053***	-0.012**
	(0.003)	(0.004)	(0.005)
Lrex	1.360***	1.503***	1.248***
	(0.033)	(0.052)	(0.062)
Cor	0.138	0.687***	-0.633***
	(0.114)	(0.176)	(0.212)
GEF	-0.256**	-0.999***	0.630***
	(0.109)	(0.169)	(0.203)
POS	0.0486	0.237***	-0.097
	(0.046)	(0.071)	(0.085)
Rlaw	-0.164*	0.215	0.100
	(0.098)	(0.152)	(0.183)
Totr	0.007**	0.031***	0.006
	(0.003)	(0.005)	(0.006)
Top	0.047**	-0.147***	0.136***
	(0.021)	(0.032)	(0.038)
Constant	0.643*	4.423***	-2.748***
	(0.379)	(0.587)	(0.706)
Adj. R^2	0.980	0.950	0.940
Observations	231	231	231
No. of countries	11	11	11

Source: Authors' computation.

Note: Dependent variables: Taxr is tax revenue, Taxg is taxes on goods and services, Inctax is taxes on income, profits and capital gains. GDP gross domestic product, grants is grants and other revenue, rex is revenue excluding grants, Cor is control of corruption, GEF is government effectiveness, POS is political stability, Rlaw is the rule of law, Totr is total natural resource rents (% of GDP) and Top is the trade openness (exports+imports)/GDP. ***, ** and * indicate 1%, 5% and 10 %significance level, while values in parenthesis are standard errors.

Table 3 shows that Oilr improves tax revenue (Taxr) and taxes on income, profit and capital gains (Inctax) at 5% and 10% significant level respectively, while it has negative but insignificant impact on taxes on goods and services (Taxg). The estimates for revenue excluding grants (rex) indicate a highly significant and positive effect on tax efforts for all three proxies. That is, a percentage point increase in rex increases Taxr, Taxg and Inctax by 1.3, 0.93 and 1.65 percentage points respectively. The results for both total natural resources rents as a percentage of GDP (i.e., Totr) and trade openness (Top) show negative and significant impacts on all the proxies for tax efforts. Conversely, GDP has negative impact on Tax revenue but it is positively related to

Taxes on goods and services and Inctax (taxes on income, profit and capital gains) even though the relationship is not significant at any conventional level. Grants is highly significant and negative for Taxr and Inctax (this is consistent with Gupta et al., 2003; Benedek et al., 2012; Crivelli and Gupta, 2014), while it is positive and insignificant for Taxes on goods and services (Taxg). Again, the variables for governance indicators exhibit mixed results. Control of corruption (Cor) has positive impact on Taxr, Taxg and negative impact on Inctax with 1% statistical significance in Taxg and Inctax. Government effectiveness (GEF) and rule of law (Rlaw) have positive and insignificant influence on Taxr and Inctax while the relationship is negative for Taxg.

Table 3. Fixed Effects and Random Effects Results for Oil-rich SSA Economies

Dependent variables	Fixed effects			Random effect		
	Taxr	Taxg	Linctax	Taxr	Taxg	Linctax
LGDP	-0.014	0.173	0.0878	-0.073***	-0.367***	0.074*
	(0.061)	(0.106)	(0.104)	(0.022)	(0.034)	(0.041)
Lgrants	-0.261***	0.091	-0.562***	-0.344***	-0.347***	-0.294***
	(0.040)	(0.070)	(0.069)	(0.031)	(0.048)	(0.057)
Oilr	0.013**	-0.007	0.016*	-0.025***	-0.053***	-0.012**
	(0.005)	(0.009)	(0.008)	(0.003)	(0.004)	(0.005)
Lrex	1.299***	0.928***	1.652***	1.360***	1.503***	1.248***
	(0.050)	(0.087)	(0.085)	(0.033)	(0.052)	(0.062)
Cor	0.002	0.419***	-0.375***	0.138	0.687***	-0.633***
	(0.078)	(0.136)	(0.133)	(0.114)	(0.176)	(0.212)
GEF	0.149	-0.098	0.107	-0.256**	-0.999***	0.630***
	(0.100)	(0.175)	(0.171)	(0.109)	(0.169)	(0.203)
POS	-0.130***	0.001	-0.151*	0.049	0.237***	-0.097
	(0.046)	(0.081)	(0.079)	(0.046)	(0.071)	(0.085)
Rlaw	0.004	-0.302*	0.331*	-0.164*	0.215	0.100
	(0.100)	(0.175)	(0.171)	(0.098)	(0.152)	(0.183)
Totr	-0.019***	-0.002	-0.016**	0.007**	0.031***	0.006
	(0.004)	(0.008)	(0.007)	(0.003)	(0.005)	(0.006)
Top	-0.032*	-0.073**	-0.101***	0.047**	-0.147***	0.136***
	(0.019)	(0.033)	(0.032)	(0.021)	(0.032)	(0.038)
Constant	-1.277	-6.783**	-6.899***	0.643*	4.423***	-2.748***
	1.508	(2.636)	(2.580)	(0.379)	(0.587)	(0.706)
Adj. R^2	0.960	0.780	0.920	0.980	0.950	0.940
Hausman test χ^2	94.550	330.890	-203.390			
	[0.000]	[0.000]	[0.000]			
Observations	231	231	231	231	231	231
No. of countries	11	11	11	11	11	11

Source: Authors' computation.

Note: Dependent variables: Taxr is tax revenue, Taxg is taxes on goods and services, Inctax is taxes on income, profits and capital gains. GDP gross domestic product, grants is grants and other revenue, rex is revenue excluding grants, Cor is control of corruption, GEF is government effectiveness, POS is political stability, Rlaw is the rule of law, Totr is total natural resource rents (% of GDP) and Top is the trade openness (exports+imports)/GDP. ***, ** and * indicate 1%, 5% and 10% significance level, while values in parenthesis are standard errors.

Nevertheless, certain issues arise with the use of the fixed-effects estimators; there is possibility of endogeneity of some of the dependent variable (da Silva and Cerqueira, 2017) and the persistence of the dependent variable over time pose another possibility of autocorrelation. To tackle these shortcomings, the study adopts the Difference generalized method of moments (Diff-GMM) as presented in Table 4 for SSA countries with oil rent. In contrast to the fixed-effect estimates, the Diff-GMM[8] estimates should be fully consistent.

By utilizing the models in differences and taking the lagged dependent variable with its past levels as instruments, we addressed these issues with difference-GMM and system-GMM. For the SSA countries with oil rent, we present the results for the GMM-difference estimator in Table 4, while Table 7 shows system-GMM results for SSA countries with other natural resources rents (without oil rents).

In order to confirm validity of the instruments, the Sargen test of over-identifying restrictions, which is less vulnerable to instrument proliferation (Roodman, 2009b), and Hansen statistic are reported. The diagnostic tests of autocorrelation in the first differenced residuals are in both models consistent with the maintained assumption of no autocorrelation in the disturbance term. The AR(1) tests reject the null hypothesis in all models that the process does not exhibit first-order serial correlation, while the AR(2) tests fail to reject the null hypothesis that the first-differenced residual error term is not second-order serially correlated.

The results with the difference-GMM estimator are somewhat identical to those with the fixed-effects estimator. Oilr has positive and insignificant impact on Taxr, Inctax and negative and insignificant effect on Taxg. This is inconsistent with previous studies such as Knack (2009) and Thomas and Treviño (2013), which found negative and significant relationship between resources revenue and non-resources revenue for developing and SSA countries. This is not unsurprising since it is expected that developing economies especially SSA economies depend on resource revenues rather than non-resource revenue. One plausible reason could be lack of proper tax records keeping and difficulty in documenting separate revenue sources. Considering the magnitude of the coefficients, a percentage point increase in Oilr give rise to an improvement in Taxr by 0.035 percentage point, Inctax by 0.032 percentage point and a decline in Taxg by 0.005 percentage point. Similar to the results of the fixed effect estimators, revenue excluding grants (rex) has high significant and positive influence on all three proxies for tax efforts in SSA economies. The relationship is more than one for one, with one percentage point rise in rex leading to 1.69, 1.57 and 1.49 percentage points in Taxr, Taxg and Inctax

[8] According to Roodman (2006), when we have large number of countries (N) and small time period (T), the difference-GMM estimator proposed by Arellano and Bond (1991) and the system-GMM estimator by Arellano and Bover (1995) and Blundell and Bond (1998) are the most appropriate models. In the case of this paper with $T = 21$ years and $N = 28$ countries (11 with oil rent and 17 without oil rent) and it is designed to handle cases in which independent variables are not strictly exogenous, meaning they are correlated with past and possibly current realization of the disturbance term (Roodman, 2009a).

respectively. Grants and Totr as a priori expectation have negative impact on all dependent variables. However, the relationship is significant between grants and Taxr, Inctax at 10%, 5% while it is insignificant for Taxg and Totr is only statistically significant at 10% for Taxr but not significant for the other tax efforts. A percentage increase in the inflow of grants will give rise to a decrease of 0.63, 0.47 and 0.45 percentage points in Taxr, Taxg and Inctax respectively; while one percentage rise in Totr will lead to a decrease of 0.04 percentage point in Taxr, 0.02 percentage point in Taxg and 0.03 percentage point in Inctax. What these results portend is that the more the inflow of grants and other revenue and a rise in total natural resources rents (% of GDP) discourage SSA countries from making serious efforts towards tax collection.

GDP has a positive impact on Taxr, Inctax and negative effect on Taxg, but it is statistically significant in Inctax at 10% significant level. In terms of magnitude of the coefficients, a percentage point increase in GDP will lead to an increase in Taxr, Inctax and a decrease in Taxg by 0.07, 0.50 and 0.04 percentage points respectively. This implies that economic development plays an important role in tax-revenue collection efforts in the SSA region. The lagged dependent variables show that previous values have an insignificant and positive effect on the current value of Taxr and a negative and insignificant impact on Taxg and Inctax. Top, just like the estimates for grants has negative but insignificant impact on Taxr, Taxg and Inctax. One percentage point increase in Top will lead to a deteriorating effect in Taxr, Taxg and Inctax by 0.002 percentage point, 0.016 percentage point and 0.026 percentage point, which may be probably as a consequence of Dutch disease-related boost in imports or to natural resource industries relying to a great deal on imported intermediate products such as machineries and technologies to support domestic manufacturing. The estimates for the governance indicators show that control of corruption (Cor) and rule of law (Rlaw) have negative but not statistically significant impact for Taxr, Taxg and Inctax. A percentage point increase in Cor and Rlaw will result to a decline of 0.12 and 0.19 percentage points in Taxr, 0.09 and 0.04 percentage points in Taxg and 0.14 and 0.28 percentage points in Inctax. These results mean that the more the control of corruption and rule of law abidance in SSA countries, the less the level of tax collection efforts. In addition, the reduced tax effort in oil-rich countries in SSA is correlated with the control of corruption index and rule of law abidance, so it is possible that the weaker tax effort is connected to the nature of the SSA economies. On the other hand, a plausible rationale for the weakened tax efforts could be the role played by higher tax exemptions in this group of countries, which can be linked to the policy choices of oil-rich governments.

GEF has insignificant and positive impact on Taxr, Inctax and negative but insignificant on Taxg. In terms of magnitudes of coefficients, one percentage point increase in GEF will lead to an increase in Taxr by 0.15, Inctax by 0.30 and a decrease in Taxg by 0.35 percentage points respectively. On the other hand, POS has positive impact on Taxr, Taxg and negative effect on Inctax. The impact however is not statistically significant at the conventional level, with a percentage point increase resulting to an increase of 0.016 percentage point in Taxr, 0.049 percentage point in

Taxg and a decline in Inctax by 0.030 percentage point. The positive relationship between GEF, POS and tax efforts (proxied by Taxr, Taxg and Inctax), means that if a country has good era, particularly in terms of government effectiveness and political stability, higher tax revenue generation is guaranteed. However, because these results are not statistically significant, it is difficult to conclude that with good governance in place, higher tax revenues will be generated.

Table 4. Difference-GMM Results for Oil-rich SSA Economies

Dependent variable	Taxr (1)	Taxg (2)	Linctax (3)
Lagged dependent variable	0 .001	-0.007	-0.044
	(0.035)	(0.050)	(0.041)
LGDP	0 .070	-0.037	0 .500*
	(0.191)	(0.330)	(0.289)
Lgrants	-0.632*	-0.473	-0.447**
	(0.344)	(0.402)	(0.175)
Oilr	0 .035	-0.005	0 .032
	(0.022)	(0.027)	(0.028)
Lrex	1.688***	1.570***	1.486***
	(0.378)	(0.448)	(0.222)
Cor	-0.115	-0.087	-0.140
	(0.117)	(0.178)	(0.113)
GEF	0 .145	-0.351	0 .300
	(0.224)	(0.312)	(0.265)
POS	0 .016	0 .049	-0.030
	(0.078)	(0.079)	(0.066)
Rlaw	-0.193	-0.044	-0.278
	(0.173)	(0.162)	(0.234)
Totr	-0.037*	-0.017	-0.029
	(0.021)	(0.022)	(0.029)
Top	-0.002	-0.016	-0.026
	(0.047)	(0.029)	(0.037)
AR(1)	-1.910	-1.650	-1.950
	[0.056]	[0.098]	[0.051]
AR(2)	0.550	0.840	-1.220
	[0.586]	[0.401]	[0.221]
Sargan test	1.190	0.070	1.760
	[0.275]	[0.789]	[0.185]
Hansen test	0.000	0.000	0.000
	[1.000]	[1.000]	[1.000]
No. of cross sections	11	11	11
No. of observations	209	209	209

Source: Authors' computation.

Note: Dependent variables: Taxr is tax revenue, Taxg is taxes on goods and services, Inctax is taxes on income, profits and capital gains. GDP gross domestic product, grants is grants and other revenue, rex is revenue excluding grants, Cor is control of corruption, GEF is government effectiveness, POS is political stability, Rlaw is the rule of law, Totr is total natural resource rents (% of GDP) and Top is the trade openness (exports+imports)/GDP. ***, ** and * indicate 1%, 5% and 10 %significance level, while values in parenthesis are standard errors.

Generally, our results on the determinants of tax efforts widely corroborate previous extant studies. The lack of significant effect of GDP on tax revenues collection in the oil rents economies in SSA is in line with other studies such as Langford and Ohlenburg (2016), Morrissey et al. (2016), Bird et al. (2014) and Tait et al. (1979), who similarly report insignificant effect among other numerous variables incorporated in the model. Our findings however contradict a number of studies in the tax revenue mobilization literature; these include Coulibaly and Gandhi (2018), Drummond et al. (2012), Gupta (2007), Adam et al. (2001), and the seminal work of Lotz and Morss (1967). A likely cause for such finding could be as a result of high correlation among the included exogenous series (Langford and Ohlenburg, 2016).

Further, the deteriorating effect the level of corruption has on tax efforts in SSA corresponds to the findings of Langford and Ohlenburg (2016), Cyan et al. (2013) and Fenochietto and Pessino (2013). Thus, confirming how administrative performance and policy decisions are detrimentally affected by the level of corruption. Similar to the findings in Langford and Ohlenburg (2016) and Castañeda and Pardinas (2012), we also find improving effect of the countries' ability to implement tax policies as indicated by the positive effect of the rule of law. Contrary to Carter (2014) and Langford and Ohlenburg (2016), we find grants from donors to significantly divert a state's tax effort. The positive effects coming from government effectiveness and political stability corroborate the findings in Coulibaly and Gandhi (2018), Langford and Ohlenburg (2016), Ali et al. (2014) and Besley and Persson (2013), indicating the state's accountability and transparency, and the citizens' compliance in paying taxes.

4.2. Results for SSA Economies with Other Natural Resources Rents (without Oil Rent)

The estimations for economies with other natural resources rents (without oil rents) are presented in Tables 5 to 7. As shown in Table 5, the OLS results for SSA countries with other natural resource rents is a mirror of the results under SSA countries with oil rent, except for GDP, Totr and Cor. Conversely to the sub-sample with oil rent, GDP has a positive and highly significant impact on Taxr, Taxg and a significant and negative relationship with Inctax. Considering the magnitude of the coefficients, a percentage point increase in GDP will result to an increase in Taxr by 0.017 percentage point, in Taxg by 0.247 percentage point and a reduction of 0.043 percentage point in Inctax. What this signifies is that an increase in GDP leads to an improvement of tax collection efforts in SSA economies. Totr has a negative and significant influence on Taxr, while the relationship is positive but significant only in Inctax at 1% level. One percentage point rise in Totr will generate a 0.004 percentage point reduction in Taxr and an increase in Taxg and Inctax by 0.003 and 0.035 percentage points respectively.

The FE and RE results are reported in Table 6. For obvious reasons stated in Section 4.1 above, we adopted FE model. Similar to the OLS results, GDP is positively and

significantly related to tax collection efforts in SSA economies. The highest impact being on Taxg followed by Inctax and Taxr. One percentage point increase in GDP will lead to an increase in Taxg by 0.33 percentage point, Inctax by 0.15 percentage point and Taxr by 0.002 percentage point. Totr has a negative impact on Taxr and Taxg, but it is statistically significant at 10% only in Taxr. Totr however has a positive and significant relationship with Inctax. Top on the other hand, is highly significant and positively related to all the proxies for tax efforts in this subsample. Grants and other revenue (grants) has negative effects on Taxr and Taxg, while the effect is positive in Inctax with significance levels at 1%, 1% and 10% for Taxr, Taxg and Inctax respectively. Revenue excluding grants (rex) and all the governance indicators have positive relationship on the three tax variables.

Table 5. Ordinary Least Squares Results for SSA Economies with Other Natural Resources

Dependent variables	Taxr	Taxg	Inctax
LGDP	0.017**	0 .247***	-0.043**
	(0.007)	(0.038)	(0.019)
LGrants	-0.088***	0 .026	-0.086***
	(0.009)	(0.044)	(0.022)
LRex	1.096***	0 .932***	1.116***
	(0.011)	(0.053)	(0.026)
Cor	-0.085***	-0.895***	0.033
	(0.023)	(0.118)	(0.059)
GEF	-0.108***	0 .143	-0.079
	(0.035)	(0.179)	(0.089)
POS	0 .016	0 .048	0.191***
	(0.013)	(0.067)	(0.033)
Rlaw	-0.010	0 .561***	-0.140
	(0.0364)	(0.184)	(0.091)
Totr	-0.004***	0 .003	0.019***
	(0.001)	(0.006)	(0.003)
Top	0 .039***	0 .391***	-0.035
	(0.014)	(0.072)	(0.036)
Constant	-0.972***	-7.118***	-1.381***
	(0.107)	(0.539)	(0.267)
Adj. R^2	0.998	0.952	0.984
Observations	357	357	357
No. of countries	17	17	17

Source: Authors' computation.

Note: Dependent variables: Taxr is tax revenue, Taxg is taxes on goods and services, Inctax is taxes on income, profits and capital gains. GDP gross domestic product, grants is grants and other revenue, rex is revenue excluding grants, Cor is control of corruption, GEF is government effectiveness, POS is political stability, Rlaw is the rule of law, Totr is total natural resource rents (% of GDP) and Top is the trade openness (exports+imports)/GDP. ***, ** and * indicate 1%, 5% and 10 %significance level, while values in parenthesis are standard errors.

Table 6. Fixed Effects and Random Effects Results for SSA Economies with Other Natural Resources

Dependent variables	Fixed effects			Random effect		
	Taxr	Taxg	Linctax	Taxr	Taxg	Linctax
LGDP	0.002	0.327**	0.148**	0.031**	0.278***	-0.073**
	(0.030)	(0.130)	(0.070)	(0.0145)	(0.077)	(0.028)
Lgrants	-0.047***	-0.109***	0.040*	-0.048***	-0.106***	0.019
	(0.009)	(0.039)	(0.021)	(0.009)	(0.038)	(0.021)
Lrex	1.057***	1.093***	1.011***	1.050***	1.100***	1.079***
	(0.015)	(0.065)	(0.035)	(0.012)	(0.055)	(0.028)
Cor	0.005	-0.216**	-0.032	-0.007	-0.230**	-0.018
	(0.024)	(0.103)	(0.056)	(0.024)	(0.101)	(0.056)
GEF	0.011	-0.044	-0.012	-0.010	-0.038	0.009
	(0.033)	(0.141)	(0.076)	(0.032)	(0.138)	(0.076)
POS	0.002	0.070	0.006	0.007	0.065	0.013
	(0.013)	(0.058)	(0.031)	(0.013)	(0.056)	(0.031)
Rlaw	-0.012	0.091	-0.105	-0.024	0.118	-0.063
	(0.034)	(0.146)	(0.079)	(0.033)	(0.142)	(0.079)
Totr	-0.002*	-0.006	0.007**	-0.002*	-0.005	0.009***
	(0.001)	(0.005)	(0.003)	(0.001)	(0.005)	(0.003)
Top	0.068***	0.428***	0.089***	0.065***	0.431***	0.090***
	(0.013)	(0.055)	(0.029)	(0.013)	(0.054)	(0.030)
Constant	-0.555	-10.115***	-6.767***	-1.149***	-9.056***	-2.077***
	(0.598)	(2.572)	(1.382)	(0.278)	(1.472)	(0.506)
Adj. R^2	0.995	0.946	0.974	0.996	0.946	0.981
Hausman test $\chi 2$	14.950	2.800	-207.350			
	[0.092]	[0.972]	[0.000]			
Observations	357	357	357	357	357	357
No. of countries	17	17	17	17	17	17

Source: Authors' computation.

Note: Dependent variables: Taxr is tax revenue, Taxg is taxes on goods and services, Inctax is taxes on income, profits and capital gains. GDP gross domestic product, grants is grants and other revenue, rex is revenue excluding grants, Cor is control of corruption, GEF is government effectiveness, POS is political stability, Rlaw is the rule of law, Totr is total natural resource rents (% of GDP) and Top is the trade openness (exports+imports)/GDP. ***, ** and * indicate 1%, 5% and 10 %significance level, while values in parenthesis are standard errors.

Table 7 reports system-GMM specification results for the SSA countries with other resources rents (without oil rents) subsample. The tests of autocorrelation in the first differenced residuals, the Sargen and Hansen tests of restrictions over-identification are satisfactory. The lagged dependent variables positively and statistically affect the current values of tax variables. That is, the previous values of Taxr, Taxg and Inctax enhance the current and future values of Taxr, Taxg and Inctax. Starting with the economic issues, GDP coefficient has a positive sign on Taxr, Taxg and a negative sign on Inctax, it is statistically significant at the 1% level for Taxr, 10% level for Inctax but insignificant for Taxg.

Table 7. System GMM Results for SSA Economies with Other Natural Resources

Dependent variable	Taxr	Taxg	Linctax
	(1)	(2)	(3)
Lagged dependent variable	0.0906**	0.368*	0.498***
	(0.046)	(0.211)	(0.159)
LGDP	0.054***	0.018	-0.182*
	(0.018)	(0.203)	(0.101)
Lgrants	-0.032	-0.063	0.094
	(0.023)	(0.056)	(0.065)
Lrex	0.918***	0.782**	0.567**
	(0.054)	(0.312)	(0.242)
Cor	-0.070*	-0.549***	0.028
	(0.041)	(0.162)	(0.271)
GEF	-0.124**	0.304	0.148
	(0.057)	(0.335)	(0.278)
POS	0.029	-0.048	0.003
	(0.025)	(0.112)	(0.066)
Rlaw	0.029	0.160	-0.274***
	(0.036)	(0.209)	(0.100)
Totr	-0.004**	0.006	0.004
	(0.002)	(0.006)	(0.006)
Top	0.070***	0.186	-0.092
	(0.024)	(0.190)	(0.079)
Constant	-1.108***	-3.617	0.382
	(0.301)	(2.531)	(1.492)
AR(1)	-1.960	-1.680	-1.810
	[0.050]	[0.093]	[0.070]
AR(2)	0.500	-0.130	-0.350
	[0.619]	[0.894]	[0.728]
Sargan test	0.700	11.820	3.120
	[0.873]	[0.223]	[0.682]
Hansen test	0.460	4.830	5.610
	[0.927]	[0.849]	[0.346]
No. of cross sections	17	17	17
No. of observations	340	340	340

Source: Authors' computation.

Note: Dependent variables: Taxr is tax revenue, Taxg is taxes on goods and services, Inctax is taxes on income, profits and capital gains. GDP gross domestic product, grants is grants and other revenue, rex is revenue excluding grants, Cor is control of corruption, GEF is government effectiveness, POS is political stability, Rlaw is the rule of law, Totr is total natural resource rents (% of GDP) and Top is the trade openness (exports+imports)/GDP. ***, ** and * indicate 1%, 5% and 10 %significance level, while values in parenthesis are standard errors.

This can be said to mean the development of these economies increase tax collection efforts in this group of countries. A percentage point improvement in the economy will result to a rise on Taxr, Taxg by 0.05, 0.02 percentage points and a decline in Inctax by

0.18 percentage point. Grants is not statistically significant, its effects are negative for all models except for Inctax; the higher the level of grants in these economies, the lesser the tax collection efforts. Totr has a negative and 5% significant impact on Taxr, but it is positive and statistically insignificant for Taxg and Inctax. The reason for the negative relationship between Grants and other revenue (grants), Total natural resources rents as a % of GDP (Totr) and tax revenues is that the increase in Grants and resources rents inflows make the government of these developing economies relax and due to political reactions they do not take decisions for domestic non-resource mobilization. Therefore, there is a general apprehension that grants and natural resources rents will decrease taxation revenue in recipient countries. These results are consistent with those found in previous extent literature on resource curse ("Dutch Disease"). In the case of revenue excluding grants (rex) and trade openness (Top), the coefficients have positive signs and are statistically significant at 1%, 5% and 5% for Taxr, Taxg and Inctax respectively. A credible reason for these could be that SSA economies with resources rents are more open to international trade; and have reduced their import tariffs, thereby expanding exports to increase the performance of the economy. This evidence of positive impact of trade openness in SSA supports the conventional argument promoting trade liberalization. This is also in consonance with previous empirical studies (e.g. see Iimi, 2007 among others).

The governance variables, Cor has negative signs on Taxr, Taxg and a positive sign on Inctax, but it is only statistically significant at the 10% and 1% level for Taxr and Taxg. GEF has a negative sign for Taxr and positive signs for Taxg and Inctax, it is only statistically significant in Taxr at 5% level and not significant in Taxg and Inctax. POS and Rlaw, on the other hand have positive signs in Taxr, negative and positive signs in Taxg, but positive and negative signs in Inctax, but only Rlaw is statistically significant at the 1% level in Inctax. These results suggest that control of corruption is a robust negative determinant of tax revenue efforts on Taxr and Taxg; GEF is robust effect on tax collection for Taxr only, while Rlaw is a good tax revenue determinant for Inctax. Thus, in this group of developing SSA countries, sound political stability and rule of law abidance are of particular importance for natural resource management and invariably higher taxation revenue (non-resource) generation. Furthermore, the tax effort and POS and Rlaw are likely to matter more for tax revenue collection and the fight against tax evasion, which means that the politically stable regime and abidance to the rule of law are more relevant indicators for fiscal performance in these countries.

Overall, because of the volatility of crude oil and other natural resource revenue, IMF (2005) suggests that it is of necessity to put in place open and proper fiscal rules for the management of mineral revenues. It was also suggested that a special account should be created wherein any windfall will be deposited and properly utilized for designated economic and social development. In the same vein, accountability and disclosure of contracts terms and profit-sharing arrangements with natural resource developers and publication of independent external audits have the same effects for increasing transparency in natural resource management. Further, resource extraction must be

strictly regulated if resource-developing enterprises are privatized. Ahmad and Mottu (2002) posit the centralization of resource revenue control and supplementing it with predictable and transparent transfers from the center. Decentralization of resource management decreases the capability of the government at the center to carry out fiscal policies that are countercyclical and to arrange equalization transfers among regions.

5. CONCLUDING REMARKS AND POLICY RECOMMENDATIONS

The primary aim of this study was to provide empirical evidence on the dependence on natural resources and tax collection efforts in SSA economies. The paper used data for 28 SSA countries to investigate the impact of natural resource revenue on tax revenue, with three different proxies for tax efforts (i.e. Tax revenue, taxes on goods and services, and taxes on profit and capital gains). SSA countries dependent on their rich natural resources have high propensity to be adversely affected by higher degree of revenue volatility. For the purpose of homogeneity, we disaggregated the dataset into two samples: 11 countries with oil rent and 17 countries with other natural resources rents (without oil rents). The study employed data covering the period 1996-2016 adopting differenced-GMM for countries with oil rent and system-GMM for countries with other natural resources rents (without oil rents).

For SSA countries with rich oil-resources, tax efforts depend less on their lagged values, which indicate that previous values of taxes do not determine the current values of tax revenue in the SSA economies with oil rents. The findings suggest that a country with high GDP, high revenue excluding grants (rex) and low level of grants and other revenue (grants), low level of total natural resources rent, low trade openness (Top) is an economy with high chances of having more tax revenue. The results for governance indicators suggested that an economy with low control of corruption, low rule of law and a country with high government effectiveness, high political stability stand a better chance of amassing large tax revenue.

Conversely, to the SSA countries with oil rent, SSA economies with other natural resources rents (without oil rents) revealed some striking results. The three tax variables used for this group of SSA countries showed that tax revenue is highly and significantly dependent on its lagged values at 5%, 10% and 1% for Taxr, Taxg and Inctax respectively. This indicates that the efforts made in the previous period towards tax collection are very important in determining the current values of tax revenue in the SSA economies without oil rents. Again, considering the economic factors, a country in this group of SSA economies with high GDP, high values for revenue excluding grants, high international trade openness, low inflow of grants and other revenue and low level of total natural resources rents will be adequately positioned to accumulate more tax revenue. This is consistent with previous studies such as Ayala-García and Dall'erba (2021), Oyarzo and Paredes (2021), Abdelwahed (2020), Ishak and Farzanegan (2020), Mawejje (2019), Gupta (2007), Davoodi and Grigorian (2007), and Thomas and Treviño

(2013). What this portends is that SSA economies without oil rents expend more efforts toward improving their other activities such as trade in order to generate more non-oil revenue than their oil rent receiving counterparts. Governance indicators exhibited that a country with more government efforts in the direction of political stability, better rule of law, less importance on control of corruption and surprisingly less government effectiveness result to improvement in accruing tax revenue.

To sum up, the implications of these results is that in SSA economies with oil rents, less effort is invested on mobilizing other non-oil-resource revenue. In these countries, trade openness deteriorates tax revenue efforts, consequently the bulk of government revenue come from the sale of crude oil. On the other hand, SSA economies with other natural resources rents (without oil rents) seem to understandably channel more efforts towards non-oil-tax revenue. In this group of countries, our results showed that trade openness are an important improvement to tax revenues.

Policy Recommendations

Oil-rents Economies

Since oil-rich developing economies especially SSA economies depend on resource revenues rather than non-resource revenue, it is recommended that they do proper tax records keeping and documentation of separate revenue sources. This will help the governments of these countries to do appropriate policy strategies to manage their resources adequately.

Given the empirical findings that more inflow of foreign aid especially grants and other revenue and total natural resources rents (% of GDP) discourage SSA countries from making serious efforts towards tax collection, these groups of economies are strongly advised to desist from dependence on foreign donor communities in terms of grants. In addition, it is recommended they channel less efforts and scarce resources towards natural resources rents.

Furthermore, as a result of the deteriorating effects of trade liberalization on tax efforts in SSA economies with oil rent, which may be probably as a consequence of Dutch disease-related boost in imports or to natural resource industries relying to a great deal on imported intermediate products such as machineries and technologies to support domestic manufacturing. It will be appropriate for these countries to reduce high import tariffs and trade barriers in order to curtail the cost of imported input intermediate products and renegotiate better trade relations with their trade partners.

Our empirical results also suggested that the more the control of corruption and rule of law abidance in SSA countries with oil rents, the less the level of tax collection efforts. In addition, the reduced tax effort in oil-rich countries in SSA is correlated with the control of corruption index and rule of law abidance, so it is possible that the weaker tax effort is connected to the nature of the SSA economies. Conversely, a plausible rationale for the weakened tax efforts could be the role played by higher tax exemptions in this

group of countries, which can be linked to the policy choices of oil-rich governments. It therefore means that a country with good governance, particularly in terms of government effectiveness, political stability and a wider tax net[9], tax revenue generation is guaranteed.

Other Resources Rents Economies (without Oil Rents)

The results for SSA economies with other natural resources rents indicated that the increase in grants and resources rents inflows make the government of these developing economies relax and due to political reactions they do not take decisions for domestic non-resource tax mobilization. Therefore, there is a general apprehension that grants and natural resources rents will decrease taxation revenue in recipient countries. Thus, as recommended under the group with oil rents, these countries are encouraged to depend less on their natural resources rents and grants from foreign donors.

SSA economies with resources rents are more open to international trade; and have reduced their import tariffs, thereby expanding exports to increase the performance of the economy. This evidence of positive impact of trade openness in SSA supports the conventional argument promoting trade liberalization. It is therefore important for them to maintain a policy of no non-tariff barriers to trade, except for health, social and security reasons. This is important because openness of these economies to import has a positive effect on tax revenue.

In addition, for this group of economies, sound political stability and rule of law abidance are of particular importance for natural resource management and invariably higher taxation revenue (non-resource) generation. Furthermore, the tax effort and POS and Rlaw are likely to matter more for tax revenue collection and the fight against tax evasion, which means that the politically stable regime and abidance to the rule of law are more relevant indicators for fiscal performance in these countries. The appropriate policy tool for these economies is that institutional improvements will help in realizing a greater share of the tax potential. Particularly, efforts towards a stable political environment, to enhance security and the legal system, and to make the state more responsive to citizens' wishes are associated with higher tax effort.

[9] Tax net often refers to number of people paying direct taxes out of total population. It is also the mechanism for ensuring that people and companies pay their taxes.

APPENDIX

Table A1. List of Countries Investigated

S/N	Economies with Oil rents	Economies with other resource rents
1	Algeria	Benin
2	Angola	Botswana
3	Congo, Dem. Rep.	Burkina Faso
4	Congo, Rep.	Burundi
5	Cote d'Ivoire	Ethiopia
6	Egypt, Arab Rep.	Gambia, the
7	Morocco	Lesotho
8	Mozambique	Madagascar
9	Nigeria	Mali
10	South Africa	Mauritius
11	Tunisia	Namibia
12		Rwanda
13		Senegal
14		Seychelles
15		Sierra Leone
16		Eswatini
17		Zambia

Source: Selected based on World Bank-World Development Indicators (WDI).

REFERENCES

Abdelwahed, L. (2020), "More Oil, More or Less Taxes? New Evidence on the Impact of Resource Revenue on Domestic Tax Revenue," *Resources Policy*, 68, 101747.

Ackah-Baidoo, P. (2016), "Youth Unemployment in Resource-rich Sub-Saharan Africa: A Critical Review," *Extractive Industries and Society*, 3, 249-261.

Adam, C., D. Bevan and G. Chambas (2001), "Exchange Rate Regimes and Revenue Performance in Sub-Saharan Africa," *Journal of Development Economics,* 64, 173-213.

Agbeyegbe, T.D., J. Stotsky and A.W. Mariam (2006), "Trade Liberalization, Exchange Rate Changes, and Tax Revenue in Sub-Saharan Africa," *Journal of Asian Economics*, 17, 261-284.

Ahmad, E. and E. Mottu (2002), "Oil Revenue Assignments: Country Experiences and Issues," IMF Working Paper 02/203, Washington, International Monetary.

Ali, M., O. Fjeldstad, and I.H. Sjursen (2014), "To Pay or Not to Pay? Citizens' Attitudes Toward Taxation in Kenya, Tanzania, Uganda and South Africa," *World Development*, 64, 828-842.

Alsharif, N., S. Bhattacharyya and M. Intartaglia (2017), "Economic Diversification in Resource Rich Countries: History, State of Knowledge and Research Agenda," *Resources Policy*, 52, 154-164.

Arellano, M. and O. Bover. (1995), "Another Look at the Instrumental Variable Estimation of Error-components Model," *Journal of Econometrics*, 68, 29-51.

Arellano, M. and S. Bond (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, 58, 277-297.

Arvanitis, Y. and M. Weigert (2017), "Turning Resource Curse into Development Dividends in Guinea-Bissau," *Resources Policy*, 53, 226-237.

Auty, R.M. (2007), "Natural Resources, Capital Accumulation and the Resource Curse," *Ecological Economics*, 61, 627-634.

Ayala-García, J and S. Dall'erba (2021), "The Natural Resource Curse: Evidence from the Colombian Municipalities," *Papers in Regional Science*, 100(2), 581-602.

Ayelazuno, J. (2014), "Oil Wealth and the Well-being of the Subaltern Classes in Sub-Saharan Africa: A Critical Analysis of the Resource Curse in Ghana," *Resources Policy*, 40, 66-73.

Badeeb, R.A., H.H. Lean and J. Clark (2017), "The Evolution of the Natural Resource Curse Thesis: A Critical Literature Survey," *Resources Policy*, 51, 123-134.

Bahl, R.W. (1971), "A Regression Approach to Tax Effort and Tax Ratio Analysis," *IMF Staff Papers*, 18, 570-612.

Ben-Salha, O., H. Dachraoui and M. Sebri. (2018), "Natural Resource Rents and Economic Growth in the Top Resource-Abundant Countries: A PMG Estimation," *Resources Policy*, 74, 101229.

Benedek, D., E. Crivelli, S. Gupta and P. Muthoora (2012), "Foreign Aid and Revenue: Still a Crowding Out Effect?" IMF Working Paper No. WP/12/186.

Bergman, M. (2002), "Who Pays for Social Policy? A Study on Taxes and Trust," *Journal of Social Policy*, 31, 289-305.

Besley, T. and T. Persson (2013), "Taxation and Development," in Auerbach A.J., R. Chetty, M. Feldstein and E. Saez, *Handbook of Public Economics,* Volume 5*,* pp. 51-110.

Bird, R.M., J. Martinez-Vazquez and B. Torgler (2008), "Tax Effort in Developing Countries and High-Income Countries: The Impact of Corruption, Voice and Accountability," *Economic Analysis and Policy*, 38 (1), 55-71.

_____ (2014), "Societal Institutions and Tax Effort in Developing Countries," *Annals of Economics and Finance,* 15(1), 185-230.

Blundell, R. and S. Bond (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Economics*, 87, 115-143.

Bornhorst, F., S. Gupta and J. Thornton (2009), "Natural Resource Endowments and the Domestic Revenue Effort," *European Journal of Political Economy*, 25, 439-446.

Bräutigam, D. (2000), "Foreign Aid and the Politics of Participation in Economic Policy Reform," *Public Administration and Development*, 20, 253-264.

Carter, P. (2014), "Does Foreign Aid Displace Domestic Taxation," *Journal of Globalization and Development,* 4(1), 1-47.

Castañeda, L.C. and J.E. Pardinas (2012), "Sub-National Revenue Mobilization in Mexico," Inter-American Development Bank Working Paper Series No. IDB-WP-354.

Castro, G.A. and D.B. Ramírez (2014), "Determinants of Tax Revenue in OECD Countries over the Period 2001-2011," *Contaduría y Administración*, 59, 35-59.

Chachu, D and E. Nketiah-Amponsah (2020), "Investigating the Fiscal Resource Curse: What's China Got to Do with It?" WIDER Working Paper No. 2020/85.

_____ (2021), "The Fiscal Resource Curse: What's China's Natural Resource Appetite Got to Do with It?" *International Review of Applied Economics*, 1-18.

Clist, P. and O. Morrissey (2011), "Aid and Tax Revenue: Signs of a Positive Effect Since the 1980s," *Journal of International Development*, 23, 165-180.

Cockx, L., and N. Francken (2016), "Natural Resources: A Curse on Education Spending?" *Energy Policy*, 92, 394-408.

Collier, P. (2006), "Is Aid Oil? An Analysis of Whether Africa can Absorb More Aid," *World Development*, 34, 1482-1497.

Collier, P. and C. Laroche (2015), "Harnessing Natural Resources for Inclusive Growth," International Growth Centre (IGC), Growth Brief in March.

Coulibaly, D.S. and D. Gandhi (2018), "Mobilization of Tax Revenues in Africa: State of Play and Policy Options," Washington DC: Brookings Institution.

Crivelli, E. and S. Gupta (2016), "Does Conditionality in IMF-supported Programs Promote Revenue Reform?" *International Tax and Public Finance*, 23, 550-579.

_____ (2014), "Resource Blessing, Revenue Curse? Domestic Revenue Effort in Resource-Rich Countries," *European Journal of Political Economy*, 35, 88-101.

Cyan, M., J. Martinez-Vazquez and V. Vulovic (2013), "Measuring Tax Effort: Does the Estimation Approach Matter and Should Effort Be Linked to Expenditure Goals?" International Center for Public Policy Working Paper 13-08.

Damette, O. and M. Seghir (2018), "Natural Resource Curse in Oil Exporting Countries: A Nonlinear Approach," *International Economics,* 156, 231-246.

Daniel, P., S. Gupta, T. Mattina and A. Segura-Ubiergo (2013), "Extracting Resource Revenue," *Finance and Development*, 50(3), 19-22.

da Silva, P.P. and A.P. Cerqueira (2017), "Assessing the Determinants of Household Electricity Prices in the EU: A System-GMM Panel Data Approach," *Renewable and Sustainable Energy Reviews,* 73, 1131-1137.

Davoodi, H.R. and D.A. Grigorian (2007), "Tax Potential vs. Tax Effort: A Cross-

Country Analysis of Armenia's Stubbornly Low Tax Collection," IMF Working Paper No. 07/106, Washington, DC: International Monetary Fund.

Drummond, P., W. Daal, N. Srivastava and L.E. Oliveira (2012), "Mobilizing Revenue in Sub-Saharan Africa: Empirical Norms and Key Determinants," IMF Working Paper 12/108, Washington: International Monetary Fund.

East African Community (2013), "Protocol on the Establishment of the East African Community Monetary Union," https://www.eac.int/documents/category/protocols, accessed on 8 October 2022.

Ebeke, C., M. Mansour and G. Rota-Graziosi (2016), "The Power to Tax in Sub-Saharan Africa: LTUs, VATs, and SARAs," Center for Study and Research on International Development, halshs.archives-ouvrtes.fr-01332049.

Fenochietto, R. and C. Pessino (2013), "Understanding Countries' Tax Effort," International Monetary Fund Working Paper WP/13/244.

Fossat, P. and M. Bua (2013), "Tax Administration Reform in the Francophone Countries of Sub-Saharan Africa," IMF Working Paper WP/13/173.

Ghura, D. (1998), "Tax Revenue in Sub-Saharan Africa: Effects of Economic Policies and Corruption," IMF Working Paper 98/135, Washington DC: International Monetary Fund.

Gupta, A.S. (2007), "Determinants of Tax Revenue Efforts in Developing Countries," IMF Working Paper 07/184, Washington, DC: International Monetary Fund.

Gupta, S., B. Clements, A. Pivovarsky and E.R. Tiongson (2003), "Foreign Aid and Revenue Response: Does the Composition of Aid Matter?" IMF Working Paper No. 03/176, Washington: International Monetary Fund.

Hausman, J.A. (1978), "Specifications Tests in Econometrics," *Econométrica*, 46, 1251-1271.

ICTD/UNU-WIDER (2019), "Government Revenue Dataset," Available at https://www.wider.unu.edu/project/government-revenue-dataset.

Iimi, A. (2007), "Escaping from the Resource Curse: Evidence from Botswana and the Rest of the World," *IMF Staff Papers*, 54(4), 663-699.

International Monetary Fund (2013), *Managing Volatility: A Vulnerability Exercise for Low-Income Countries*, Washington DC: International Monetary Fund.

_____ (2013), *Managing Volatility: A Vulnerability Exercise for Low-Income Countries*, Washington DC: International Monetary Fund.

Ishak, P.W and M.R. Farzanegan (2020), "The Impact of Declining Oil Rents on Tax Revenues: Does the Shadow Economy Matter?" *Energy Economics*, 92, 104925.

Karl, T.L. (1997), *The Paradox of Plenty: Oil Booms and Petro-States*, California University Press, Berkeley.

Kloeden, D. (2011), "Revenue administration reforms in Anglophone Africa since the early 1990s," IMF Working Paper WP/11/162.

Knack, S. (2009), "Sovereign Rents and Quality of Tax Policy and Administration," *Journal of Comparative Economics*, 37, 359-371.

Langford, B and T. Ohlenburg (2016), "Tax Revenue Potential and Effort - An

Empirical Investigation," International Growth Centre Working Paper. No. S-43202-UGA-1

Lawer, E.T., M.C. Lukas and S.H. Jørgensen (2017), "The Neglected Role of Local Institutions in the 'Resource Curse' Debate. Limestone Mining in the Krobo Region of Ghana," *Resources Policy*, 54, 43-52.

Leite, C. and J. Weidmann (1999), "Does Mother Nature Corrupt? Natural Resources, Corruption, And Economic Growth." in: Abed, G. and S. Gupta (Eds), *Governance, Corruption, and Economic Performance*, Washington: International Monetary Fund.

Leuthold, J.H. (1991), "Tax Shares in Developing Economies: A Panel Study," *Journal of Development Economics,* 35, 173-185.

Levi, M. (1988), *Of Rule and Revenue*, University of California Press, Berkeley.

Lotz, J.R. and E.R. Morss (1967), "Measuring 'Tax Effort' in Developing Countries," *IMF Staff Papers*, 14, 478-499.

Lundstøl, O., G. Raballand and F. Nyirongo (2013), "Low Government Revenue from the Mining Sector in Zambia and Tanzania: Fiscal Design, Technical Capacity or Political Will?" ICTD Working Paper No. 9, Brighton: Institute of Development Studies.

Mahdavi, S. (2008), "The Level and Composition of Tax Revenue in Developing Countries: Evidence from Unbalanced Panel Data," *International Review of Economics and Finance*, 17, 607-617.

Masi, T., A. Savoia and K. Sen (2020), "Is There a Fiscal Resource Curse? Resource Rents, Fiscal Capacity, and Political Institutions in Developing Economies," WIDER Working Paper No. 2020/10.

Mawejje, J. (2019), "Natural Resources Governance and Tax Revenue Mobilization in Sub Saharan Africa: The Role of EITI," *Resources Policy*, 62, 176-183.

Moore, M. (1998), "Death without Taxes: Democracy, State Capacity and Aid Dependence in the Fourth World" in: Robinson, M. and G. White (Eds.), *The Democratic Development State*, Oxford University Press, Oxford.

Moore, M. (2007), "How Does Taxation Affect the Quality of Governance," IDS Working Paper 280, Brighton, UK.

Morrissey, O., W. Prichard and S. Torrance (2014), "Aid and Taxation: Exploring the Relationship Using New Data," ICTD Working Paper 21.

Morrissey, O., C. von Haldenwang, A. von Schiller, M. Ivanyna and I. Bordon (2016), "Tax Revenue Performance and Vulnerability in Developing Countries," *Journal of Development Studies*, 52, 1689-1703.

Ndiaye, M.B.O. and R.D. Korsu (2014), "Tax Effort in ECOWAS Countries," in: Seck D. (Eds), *Regional Economic Integration in West Africa*, Advances in African Economic, Social and Political Development: Springer, Cham. 137-158.

Organisation for Economic Co-operation and Development (2008), *OECD Factbook 2008*, Paris, France: OECD publishing.

Olanya, D.R. (2015), "Will Uganda Succumb to the Resource Curse? Critical Reflections," *Extractive Industries and Society*, 2, 46-55.

Oyarzo, M. and D. Paredes (2021), "The Subnational Crowding Out Effect of Mining Windfalls on Local Tax Effort: Does the Level of Local Provision of Public Goods Matter?" *Extractive Industries and Society*, 8(4), 100993.

Oyinlola, M.A., O. Adeniyi and I. Raheem (2015), "Natural Resource Abundance, Institutions and Economic Growth in Africa," *African Journal Economic and Sustainable Development*, 4, 34-48.

Parcero, O.J. and E. Papyrakis (2016), "Income Inequality and the Oil Resource Curse," *Resource and Energy Economics*, 45, 159-177.

Peck, A. (2021), "Standard Oil, Consolidation Coal, and the Roots of the Resource Curse in West Virginia," *WVU College of Law Research Paper Forthcoming, West Virginia Law Review, Forthcoming*, Available at SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3827306.

Prichard, W., J.-F. Brun and O. Morrissey, (2013), "Donors, Aid and Taxation in Developing Countries - An Overview," ICTD Research in Brief No. 4.

Raddatz, C. (2007), "Are External Shocks Responsible for the Instability of Output in Low-Income Countries?" *Journal of Development Economics*, 84, 155-187.

Roodman, D. (2009a), "How to Do xtabond2: An introduction to Difference and System GMM in Stata," *Stata Journal*, 9, 86-136.

_____ (2009b), "A Note on the Theme of Too Many Instruments," *Oxford Bulletin of Economics and Statistics*, 71, 135-158.

_____ (2006), "How to Do xtabond2," In *North American Stata Users' Group Meetings*, No. 8, Stata Users Group.

Ross, M. (1999), "The Political Economy of the Resource Curse," *World Politics*, 51, 297-322.

_____ (2001), "Does Oil Hinders Democracy?" *World Politics*, 53, 325-361.

Sachs, J.D. and A.M. Warner (1995a), "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity*, 1, 1-118.

_____ (1995b), "Natural Resource Abundance and Economic Growth," National Bureau of Economic Research (NBER) Working Paper No.5398.

_____ (2001), "The Curse of Natural Resources," *European Economic Review*, 45, 827-838.

Sala-i-Martin, X. and A. Subramanian (2013), "Addressing the Natural Resource Curse: An Illustration from Nigeria," *Journal of African Economies*, 22, 570-615.

Sisso, D.C and O. Beaumais (2018), "Gold Price Volatility, Tax Revenue, and Employment: Can Burkina Faso's Adaptation Strategy Avoid the Natural Resource Curse?" *Environment and Development Economics*, 23(5), 543-557.

Stotsky, M. J.G. and M. A. WoldeMariam (1997), "Tax Effort in Sub-Saharan Africa," IMF Working Paper 97/107, Washington, DC: International Monetary Fund.

Tait, A., W. Graetz and B. Eichengreen (1979), "International Comparisons of Taxation for Selected Developing Countries," *IMF Staff Papers*, 26(1), 123-156.

Tanzi, V. (1987), "Quantitative Characteristics of the Tax Systems of Developing Countries," in David Newbery and Nicholas Stern (Eds), *The Theory of Taxation in*

Developing Countries, Oxford University Press.
Tanzi, V. (1992), "Structural Factors and Tax Revenue in Developing Countries: A Decade of Evidence," in I. Goldin and L.A. Winters (Eds), *Open Economies: Structural Adjustment and Agriculture*, Cambridge: Cambridge University Press.
Tanzi, V. and H. Davoodi, (1997), "Corruption, Growth, and Public Finances," in: Abed, G. and S. Gupta (Eds), *Governance, Corruption, and Economic Performance*, Washington: International Monetary Fund.
Thies, C.G. (2010), "Of Rulers, Rebels, and Revenue: State Capacity, Civil War Onset, and Primary Commodities," *Journal of Peace Research,* 47, 321-332.
Thomas, A. and J. Treviño (2013), "Resource Dependence and Fiscal Effort in Sub-Saharan Africa," IMF Working Paper 13/188, Washington: International Monetary Fund.
Treisman, D. (2007), "What Have We Learned about the Causes of Corruption from Ten Years of Cross-National Empirical Research?" *Annual Review of Political Science*, 10, 211-244.
Tyburski, M., P. Egan and A. Schneider (2020), "Deep Determinants of Corruption? A Subnational Analysis of Resource Curse Dynamics in American States," *Political Research Quarterly*, 73(1), 111-125.
Van Alstine, J., J. Manyindo, L. Smith, J. Dixon and I. Aminiga Ruhanga, (2014), "Resource Governance Dynamics: The Challenge of 'New Oil' in Uganda," *Resources Policy*, 40, 48-58.
von Haldenwang, C. and M. Ivanyna (2017), "Does the Political Resource Curse Affect Public Finance? The Vulnerability of Tax Revenue in Resource-Rich Countries," WIDER Working Paper No. 2017/7.
Wigley, S. (2017), "The Resource Curse and Child Mortality, 1961-2011," *Social Science and Medicine*, 176, 142-148.
World Development Indicators - WDI (2017), Available at: https://data.worldbank.org/products/wdi, accessed on March 10.
Yohou, H. D. and M. Goujon (2017), "Reassessing Tax Effort in Developing Countries: A Proposal of a Vulnerability-Adjusted Tax Effort Index (VATEI)," Fondation pour les études et recherches sur le développement international (FERDI) Working Paper Indicator No. 186.
Yohou, H.D., M. Goujon and W. Ouattara (2016), "Heterogeneous Aid Effects on Tax Revenues: Accounting for Government Stability in WAEMU Countries," *Journal of African Economies,* 25, 468-498.

Mailing Address:Terver Theophilus Kumeka (Corresponding Author), Department of Economics, Faculty of Economics and Management Sciences, University of Ibadan, Ibadan, Oyo State, Nigeria, E-mail: terverkumeka@yahoo.com.

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