UNISA ECONOMIC RESEARCH
WORKING PAPER SERIES

The paradox of governance and natural resource rents in Sub-Saharan Africa

Simplice A. Asongu

Nicholas M. Odhiambo

Simplice A. Asongu
Department of Economics
University of South Africa
P. O. Box 392, UNISA
0003, Pretoria
South Africa
Emails: asongusimplice@yahoo.com /
asongus@afridev.org

Nicholas M. Odhiambo
Department of Economics
University of South Africa
P. O. Box 392, UNISA
0003, Pretoria
South Africa
Emails: odhianm@unisa.ac.za /
nmbaya99@yahoo.com

The paradox of governance and natural resource rents in Sub-Saharan Africa

Simplice A. Asongu[1] and Nicholas M. Odhiambo[2]

Abstract

In this study, nexuses between governance and natural resource rents are assessed in 44 sub-Saharan African countries using data for the period 1996-2016. The empirical evidence is based on Tobit regressions. The findings show that political governance (entailing "voice & accountability" and political stability) and institutional governance (consisting of the rule of law and corruption control) have a negative effect on resource rents. However, if the conception and definition of attendant governance variables are understood within the framework that such variables are negatively skewed, it becomes apparent that bad governance reduces resource rents. This conclusion clarifies the paradox because negatively skewed governance variables are understood to be representing poor governance. By extension, the negative effect of the rule of law or corruption control on natural resource rents should be the negative effect of the absence of the rule of law or lack of corruption control on natural resource rents. The paradox is further clarified in the light of specific components of the governance dynamics. While the clarification of the paradox is relative, especially if the sample is compared with countries for which governance indicators are largely skewed in the positive direction, from an absolute perspective (i.e. exclusively from the sampled countries), the indicators of the World Bank are standardized such that negative skewness does not affect the estimated results. Another worthwhile argument with which to explain the paradox is that governance has more impact on the nonresource component of GDP.

Keywords: Natural Resources; Economic Growth; Governance; Sub-Saharan Africa

JEL Classification: H10;Q20; Q30; O11; O55

---

[1] Corresponding author[Senior Researcher]; Department of Economics, University of South Africa, P.O. Box 392, UNISA 0003, Pretoria, South Africa. Email: asongusimplice@yahoo.com
[2] Professor; Department of Economics, University of South Africa, P.O. Box 392, UNISA 0003 Pretoria, South Africa. Email: odhianm@unisa.ac.za

1. Introduction

The main purpose of this study is to clarify the paradox of governance and natural resource rents in developing countries with specific reference to Sub-Saharan Africa (SSA), where concerns of governance and the natural resource curse are most apparent (Shaxson, 2007; Badeep, Lean & Clark, 2017; Ajide & Raheem, 2016a, 2016b; Asongu & Nnanna, 2019). In order to clarify the contribution of this study to the attendant literature, it is worthwhile to: (i) articulate the debate on the nexus between governance and natural resource rents; and (ii) clarify the contribution to the literature in the light of insights into why the paradox of governance and natural resource rents should be elucidated with respect to mainstream governance indicators. The two points are expanded in the same chronology as they have been highlighted.

First, there is a longstanding debate on the effects of institutions on resource rents and vice-versa. One strand of the debate maintains that rents from natural resources are linked to a multitude of unfavourable socio-economic and institutional externalities, *inter alia*: political strife, violence and bad governance (Iimi, 2007; Hodler, 2006; Frankel, 2012). Some notable findings include: (i) Sala-i-Martin and Subramanian (2013), who conclude that natural resources negatively influence economic growth because of their unfavourable incidence on institutional quality. (ii) The Nigerian experience articulated by Sala-i-Martin and Subramanian (2013) is corroborated by Arezki and Galyfason (2011) in a panel of 29 nations in Sub-Saharan Africa. (iii) According to Bhattacharyya and Hodler (2010), in states that are not democratic, corruption is positively influenced by natural resource rents. This finding corroborates those of Arezki and Brückner (2011) on the nexus between corruption and political instability in a panel of 31 oil-wealthy countries. Bhattacharyya and Hodler (2010) also investigate the nexus between natural resources and corruption to conclude that the incidence is contingent on the quality of democratic institutions.

Contrary to the main strand of literature on the unfavourable incidence of natural resource rents on institutions, there is another strand of literature supporting the position that institutions do not exert a significant causal effect on natural resource rents (Sachs & Warner, 1995; Brunnschweiler, 2008). Accordingly, Brunnschweiler (2008) revisits the conclusions of Sachs and Warner (1995) on the linkage between natural resources and economic growth, and establish that no evidence is apparent on the negative indirect impact of natural resources via the institutional mechanism. The second strand is close to studies that have concluded that natural resource dependence/abundance tends to be linked with low levels of democracy and a strong likelihood for authoritarian governments (Karl, 1997; Ross 2001; Wantchekon, 2002;

Tsui, 2011). However, a third strand of the debate argues that institutions are fundamental in determining how natural resources affect economic prosperity (Mehlum, Moene & Torvik, 2006; Torvik, 2009; Mavrotas, Murshed & Torres, 2011; Sarmidi, Law & Jafari, 2014). To put this third strand into more perspective, Sarmidi et al. (2014) and Torvik (2009) opine that the negative incidence of natural resource rents on economic prosperity can be mitigated by the enhancement of institutional quality: a thesis that is broadly consistent with Mehlum et al. (2006) and Mavrotas et al. (2011) who have argued that the performance of economic growth in resource-rich countries depends on how the underlying resources are distributed through institutional settings.

Second, in spite of the substantially documented literature on the role of institutions in economic development (Robinson, Torvik & Verdier, 2006; Mehlum et al., 2006; Tella & Ades, 1999; Barro, 1999; Ross, 2001; Jensen & Wantchekon, 2004; Collier & Hoeffler, 2005; Boschini, Pettersson & Roine, 2007; Horvath & Zeynalov, 2014; Frankel, 2012), with contrasting views on the insignificant role of institutions (Sachs & Warner, 1995) versus institutions playing a fundamental role in alleviation the resource curse (Mehlum et al., 2006; Collier & Hoeffler, 2009), the literature has failed to clarify that the incidence of institutions on natural resource rents may be contingent on conceptual and measurement conflations of institutions. For instance, in a situation where the institutional variables capture both positive and negative signals, the positive effect of institutions on natural resource rents maybe contingent on the fact that institutions are positively skewed, and a negative effect of institutions on natural resource rents may also be contingent on the negative skewness of institutional quality variables. This may be the case with World Governance Indicators (WGI) of the World Bank that are both negatively and positively skewed because they range from -2.5 to +2.5. It follows that in countries where such governance variables are negatively skewed, such as in SSA, good governance can negatively or positively affect natural resources, whereas in real terms, poor governance is the origin given that governance indicators in the sampled countries are for the most part negatively skewed.

In light of the above, this study seeks to clarify a paradox of governance and natural resource in SSA, notably that a negative effect of governance on natural resource rents is, in fact, a negative effect of bad governance on natural resource rents because the underlying governance indicators are skewed negatively. By extension, the negative effect of the rule of law or corruption control on natural resource rents should be the negative effect of the absence of the rule of law and lack of corruption control on natural resource rents. It is worthwhile to emphasize that this paradox builds on the fact that while the governance

indicators from WGI capture both positive and negative signals, they are conceived and understood as good governance indicators, which is misleading for developing countries, especially those with poor governance standards.

In light of the above, the contribution of this study is, therefore, to clarify a paradox and, hence, highlight the need for governance measures to be classified in terms of good and bad governance measures. The specific issue being addressed is that when the concept of governance is used without emphasis on whether the corresponding measurement reflects good governance or bad governance, such can lead to misplaced policy implications because the measurement of governance entails both positive and negative values which capture, respectively, good governance and bad governance. This study provides empirical evidence to substantiate the validity of the paradox and, by extension, consolidate the importance of distinguishing between good governance and bad governance in the conception and measurement of governance indicators.

The positioning of this study departs from extant contemporary literature, which has focused on, *inter alia*, the nexuses between natural resource rents, economic growth and human development (Sinha & Sengupta, 2019; Mohamed, 2020); the challenge of governance in the light of natural resources rents (Fagbemi & Adeoye, 2020); the effect of natural resources on labour shares (Al-Marhubi, 2020); connections between natural resources, institutional quality, indebtedness and manufacturing (Amiri, Samadian, Yahoo & Jamali, 2019; Muhanji, Ojah & Soumaré, 2019); insights into the natural resource curse (Henri, 2019); secession with natural resources (Dhillon, Krishnan, Patnam & Perroni, 2020); how oil wealth affects development in the long term (Cassidy, 2019); intensive and extensive margins of mining and development (Mano, Bhattacharyya& Moradi, 2019) and the nexus between resource discovery and the political fortunes of national leaders (Bhattacharyya & Keller, 2020).

The rest of the study is organised in the following manner. The next section provides the theoretical underpinnings, which are followed by a section on the data and methodology. The third section provides and discusses the empirical results, while the last section concludes with future research directions.

2. Theoretical underpinnings and stylized facts

The theoretical consideration on the relationship between governance and economic development is in accordance with the corresponding literature related to how governance systems affect outcomes of economic development (McGuire & Olson, 1996; Zureiqat, 2005).

Building on the theoretical insights, three main forms of governance organization are apparent, notably, those articulating, anarchy, dictatorship and democracy. Accordingly, these three principal governance forms are consistent with the governance measurements used in this study to appreciate political governance and institutional governance. According to the attendant literature: "*The first concept is about the process by which those in authority are selected and replaced (Political Governance): voice and accountability and political stability. … The last, but by no means least, regards the respect for citizens and the state of institutions that govern the interactions among them (Institutional Governance): rule of law and control of corruption*" (Andres, Asongu & Amavilah, 2015:1041).

The three main forms of governance above (i.e. anarchy, dictatorship and democracy) can be clarified within the framework of the conceptions and definitions of political governance and institutional governance used in this study in the light of Andrés et al. (2015). Unfortunately, while these definitions of governance variables from the World Bank normatively reflect positive governance signals, not all the three forms of governance identified in the theoretical framework are positive governance signals. For instance, democracy is a positive signal while anarchy and dictatorship are negative signals. It follows that these negative signals characterizing the theoretical framework may not be fully reflected in the empirical exercise if governance measurements used are qualified as positive and but yet measured as both negative and positive in terms of skewness. This conflation partly informs the paradox this study aims to clarify.

First, on the front of anarchy, governance is characterized by "roving bandits" who take laws into their hands in total disrespect of existing institutions (Zureiqat, 2005). This directly affects both political governance and institutional governance in the perspectives that such anarchy can compromise: (i) political governance or the election and replacement of political leaders which is captured by political stability and "voice & accountability" and (ii) institutional governance or the respect by the State and citizens of institutions that govern interactions between them, captured by corruption control and the rule of law.

Second, as argued by McGuire and Olson (1996), "stationary bandits" often create autocracies with the main objective of monopolising theft. Such a characteristic of autocracy can severely constrain both political and institutional governance. Accordingly, in the light of the premise that the laws in place affect how corporations and people are productive, autocratic leaders are constrained by taxpayers who are only prepared to pay more taxes in exchange for better political and institutional governance standards (Eubank, 2012; Asongu, 2015). Hence, a direct consequence is that citizens and corporations are left with less

production incentives which could affect trade and rents corresponding to the production of natural resources. However, compared to anarchy when such production incentives are not apparent, in autocracies, conditions are created to increase the income of citizens and corporations as well as provide a favourable environment for the extraction of rents through taxation.

Among the identified three forms of governance, democracy seems to be the most effective in being positively associated with political and institutional governance. As argued by McGuire and Olson (1996), democratic institutions are linked with relatively more availability of public goods and trade, compared to the previous two forms of governance (i.e. anarchy and autocracy). Moreover, democratic forms of organisation have been established to be associated with higher standards of institutional and economic governance (Keefer, 2007). Hence, such comparatively higher standards can improve conditions for international trade and, by extension, the trade in natural resources.

In the light of the above, linkages between the engaged forms of governance and trade are tailored such that some forms of governance provide more conducive conditions for trade activities than others. This theoretical nexus between governance and international trade (which subsequently drives economic development) is articulated in Oslon (1991). Accordingly, the attendant literature is consistent with the position that poor governance is negatively linked with development outcomes while good governance is linked to the opposite effect (De Haan & Siermann, 1996; Alesina, Ozler, Roubini & Swagel, 1996).

When the attendant theoretical underpinnings are narrowed to the concept of international trade and, by extension, natural resource rents, Alesina et al. (1996) and Asongu and Nnanna (2019) argue that the poor governance is linked to uncertainties for incentives and, by extension, fewer opportunities for natural resource rents. The underlying association is essentially premised on the evidence that economic agents (including those exploiting and exporting natural resources) prefer macroeconomic environments that are more stable (Kelsey & le Roux, 2017, 2018). The arguments of DeHaan and Siermann (1996) are broadly aligned with the theoretical underpinnings of this study because governance standards determine the demand and supply of capital and labour, which are naturally associated with levels of trade and exports of natural resources. The authors substantiate that poor governance is linked to, *inter alia*, capital flight, less domestic investment, capital loss and brain drain, which are essential in trade and economic productivity. The narratives in this section motivate the formulation of the following testable hypothesis which is investigated in the next sections.

Hypothesis 1: Political and institutional governance increase natural resource rents in Sub-Saharan Africa.

Figure 1: Political governance, institutional governance and natural resource rents
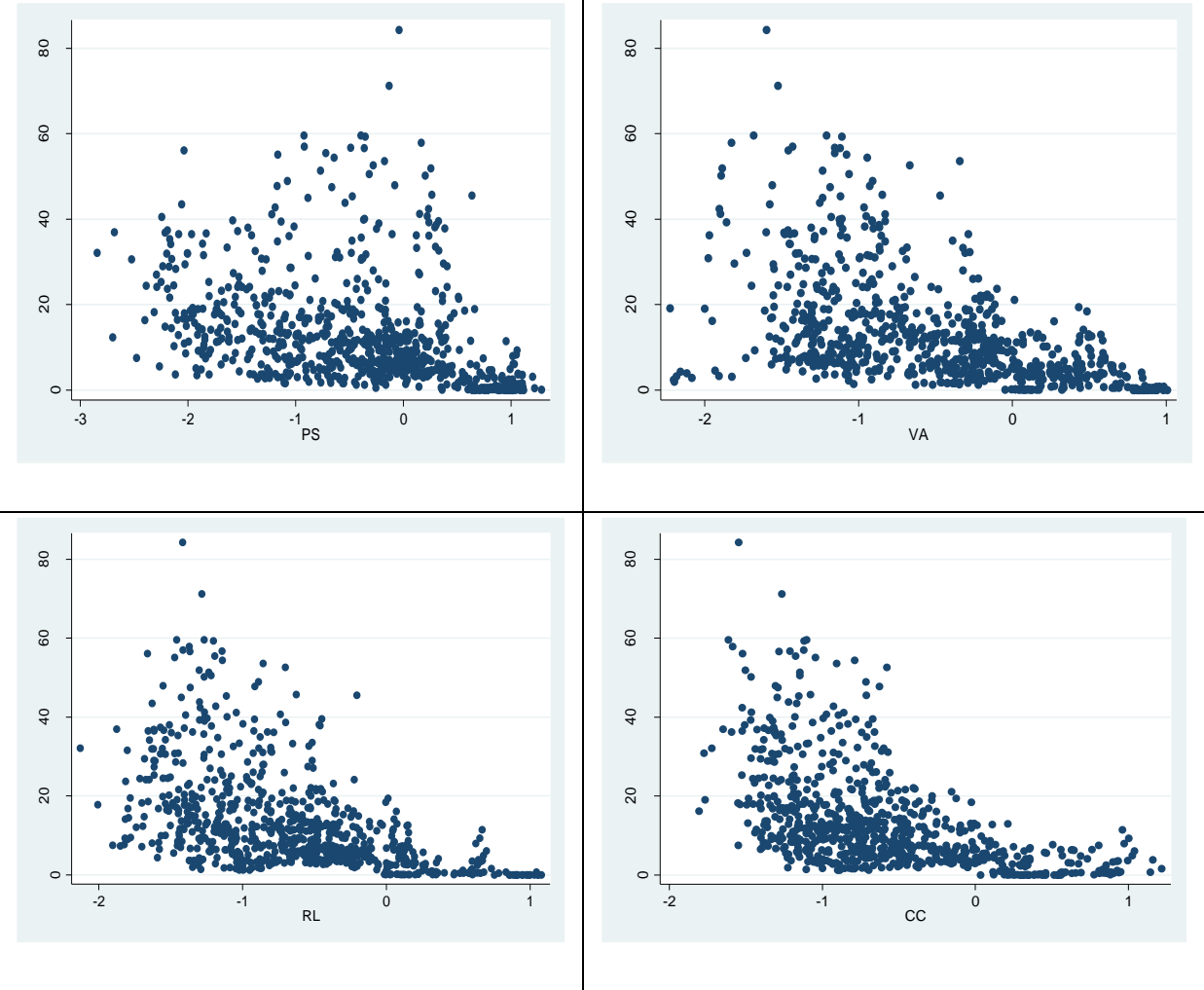
Notes. TNRS: Natural ressource rents. PS: Political stability. RL: Rule of law. CC: Corruption-Control.

Figure 1 which shows the correlation between governance and natural resource rents suggests that there is consistently a negative nexus between the governance and natural resource rents.

Figure 1, which shows the correlation between governance and natural resource rents, suggests that there is consistently a negative nexus between governance and natural resource rents. This is the case with political stability (top left), voice and accountability (top right), rule of law (bottom left) and corruption control (bottom right). The natural resource rent proxy is on the vertical axis, while the governance variables are on the horizontal axis. It is apparent from the Figure that the correlations are contrary to the stated hypothesis. However,

it is relevant to assess whether the correlations withstand empirical scrutiny through a robust empirical analysis.

3. Data and methodology

3.1 Data

In order to investigate the tested hypothesis formulated in the previous section, the study focuses on 44 countries in SSA for the period 1996-2016[3]. The focus on SSA is because the concerns of governance and the natural resource curse are comparatively more apparent in the sub-region compared to other regions and continents in the world (Tadadjeu, Njangang, Ningaye & Nourou, 2020; Mignamissi & Kuete, 2021). The main sources from which the data are obtained are: (i) World Governance Indicators (WGI) of the World Bank from which the governance or independent variables of interest are gathered and (ii) World Development Indicators (WDI) of the World Bank from which the outcome and control variables are obtained.

The outcome variable is total natural resources rents (% of GDP), in the light of contemporary natural resource rents literature (Henri, 2019; Guan, Kirikkaleli, Bibi & Zhang, 2020). The choice of political governance and institutional governance as the independent variables of interest is consistent with the motivation of the study, the theoretical underpinnings in Section 2 as well as contemporary African governance literature (Pelizzo, Araral, Pak & Xun, 2016; Ajide & Raheem, 2016a, 2016b; Amavilah et al., 2017; Asongu & Kodila-Tedika, 2017; Pelizzo & Nwokora, 2016, 2018; Nwokora & Pelizzo, 2018; Opeyemi, Uchenna, Asongu & Osabuohein, 2019).

In order to take on board the concern of variable omission bias, three controls are considered in the study, namely: inflation, trade openness and foreign direct investment. Inflation is measured as the annual rate of growth in the GDP implicit deflator, and it showsthe rate of price change in the whole economy, while trade openness is the sum of exports and imports of goods and services (i.e. commodities) in the economy (% of GDP). Foreign direct investment net inflows (% of GDP) measures net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors and is divided by GDP. The selection of these indicators builds on the attendant literature on international trade (Cipollina et al., 2016; Asongu & Kodila-Tedika, 2017; Fonchamnyo & Akame, 2017; Dary

---

[3]The sampled 44 countries are: "*Angola; Benin; Botswana; Burkina Faso; Burundi; Cabo Verde; Cameroon; Central African Republic; Chad; Comoros; Congo Democratic Republic; Republic of Congo; Cote d'Ivoire; Equatorial Guinea; Eritrea; Ethiopia; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Mozambique; Namibia; Niger; Nigeria; Rwanda; Sao Tome and Principe; Senegal; Seychelles; Sierra Leone; South Africa; Tanzania; Togo; Uganda; Zambia and Zimbabwe*".

& James, 2018; Bahmani-Oskooe & Gelan, 2018; Blanas & Seric, 2018; Uysal & Mohamoud, 2019; Kaminchia, 2019). As concerns, the anticipated signs, inflation is expected to negatively influence rents obtained from natural resources, whereas trade openness and FDI are anticipated to have the opposite or positive effect. This is essentially because FDI and trade openness are directly connected with the exploitation and exportation of natural resources, while high prices (i.e., inflation) could decrease the demand for resources, on the one hand, and, on the other, mitigate incentives for investment in the sector because investors have been documented to be privileged with economic environments with less macroeconomic uncertainty (Kelsey & le Roux, 2017, 2018). Moreover, the choice of three control variables is motivated by the need to avoid instrument proliferation in the GMM specification, as in the contemporary GMM-centric literature, even when the option of collapsing instruments is taken on board in the estimation exercise (Tchamyou, 2019, 2020). To put this point into perspective, some GMM-oriented studies include zero control variable (Osabuohien & Efobi, 2013) or two control variables (Bruno,De Bonis & Silvestrini, 2012; Asongu & Odhiambo, 2020a) in order to avoid the proliferation of instruments and the bias of estimated results. Appendix 1 provides the definitions and sources of variables; Appendix 2 discloses the summary statistics, while the correlation matrix is presented in Appendix 3.

3.2 Methodology

3.2.1 GMM: specification, identification and exclusion restrictions

The choice of the empirical strategy adopted in this study is motivated on two fronts, notably, the attendant literature on the requirement for the adopted estimation technique to be in line with the data behavior (Kou, Chao, Peng & Alsaadi, 2019; Kou, Yang, Xiao, Chen & Alsaadi, 2019; Kou, Lu, Peng & Shi, 2012; Kou, Ergu, Chen, Lin, 2016; Kou, Peng & Wang, 2014). On the other hand, there are four main GMM specific insights that further motivate the choice of the adopted estimation strategy. Consequently, in the light of attendant GMM-oriented studies, there is a fourfold motive for adopting the underlying estimation approach (Tchamyou, 2019, 2020). (i) The N>T condition for the adoption of the estimation strategy is consistent with the data structure of this study, given that the numerical value of cross sections (i.e. N) is superior to the attendant years characterizing the time series in every cross section (i.e. T). In other words, 44 countries>21 years contained in each cross section. (ii) Natural resource rents are persistent given that the correlation between the level and first lag series is greater than an established rule of thumb which is 0.800 (Meniago & Asongu, 2018; Tchamyou et al., 2019a, 2019b). (iii) With regard to the panel nature of the dataset, it is

apparent that cross sectional differences are considered within the analytical framework. (iv) The empirical approach is tailored to account for endogeneity on two fronts by, on the one hand, considering the unobserved heterogeneity by controlling for time-invariant variables and,on the other, engaging internal instruments to account for reverse causality or simultaneity. The empirical approach considered in this study is the Roodman (2009a, 2009b) improvement of Arellano and Bover (1995) which is increasingly being employed in the literature because of its advantage of limiting instrument proliferation and providing more robust estimates (Boateng et al., 2018).

The following equations in level (1) and first difference (2) summarise the standard *system* GMM estimation procedure.

$$R_{i,t} = \sigma_0 + \sigma_1 R_{i,t-\tau} + \sigma_2 G_{i,t} + \sum_{h=1}^{3} \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \qquad (1)$$

$$\begin{aligned} R_{i,t} - R_{i,t-\tau} &= \sigma_1(R_{i,t-\tau} - R_{i,t-2\tau}) + \sigma_2(G_{i,t} - G_{i,t-\tau}) \\ &+ \sum_{h=1}^{3} \delta_h(W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \end{aligned} \qquad (2)$$

where, $R_{i,t}$ denotes natural resources rents of country i in period t, σ_0 is a constant, σ_1 is the parameter related to natural resource rents, G represents political ("voice & accountability" and political stability/no violence) and institutional (corruption control and the rule of law) governance , σ_2 is the parameter corresponding to governance dynamics, W is the vector of control variables (inflation, trade openness and foreign direct investment), δ_h represents parameters corresponding to the adopted three control variables considered and therefore, h varies from 1 to 3 (i.e. δ_1 for inflation, δ_2 for trade openness and δ_3 for foreign direct investment), τ represents the coefficient of auto-regression which is one in this study because a year lag is enough to capture information of the past, ξ_t is the time-specific constant, η_i is the country-specific effect and $\varepsilon_{i,t}$ is the error term.

3.2.2 Identification and exclusion restrictions

It has been substantially documented that in a GMM specification, a narrative on identification and exclusion restrictions is worthwhile for a robust empirical analysis. Some contemporary studies informing this position are: Tchamyou and Asongu (2017), Tchamyou (2019, 2020), Boateng et al. (2018) and Tchamyou et al. (2019b). In accordance with the underlying literature, in the identification process, the: (i) outcome variable is natural resource

rents; (ii) endogenous explaining or predetermined variables are the independent variables interest (i.e. governance) and elements in the conditioning information set (or set of control variables) and (iii) years or time-invariant variables are considered as strictly exogenous[4]. Still consistent with the attendant literature, the exclusive restriction assumption holds if the selected strictly exogenous variables influence the outcome variable exclusively via the predetermined variables.

The criterion employed to assess the validity of the underpinning exclusion restriction test is the Difference in Hansen Test (DHT). Building on these insights, in the findings that are reported in the empirical results section, the validity of the exclusion restriction assumption is contingent on a failure to reject the null hypothesis of the DHT. It follows that the alternative hypothesis of the DHT should be rejected in order for the exclusion restriction assumption to withstand empirical scrutiny. This procedure of the DHT withstanding empirical scrutiny within a GMM framework is consistent with a more traditional (IV) estimation approach in which the null hypothesis surrounding over-identification restrictions should not be rejected in order for the identified instruments to elicit the outcomes variable exclusively via the proposed mechanisms or endogenous explaining variables (Beck et al., 2003).

3.2.3 Tobit regressions

In the light of information disclosed in the abstract, the natural resource rents variable is defined in the specific percentage interval (i.e. 0% to 100%). Hence, in the light of contemporary literature, given that the outcome variable is within a specified range (Ajide et al., 2019), this study employs a double-censored Tobit empirical strategy to further assess the incidence of political and institutional governance on natural resource rents. In essence, the double-censored Tobit approach has been established to be convenient when the dependent variables are within minimum and maximum intervals (Kumbhakar & Lovell, 2000; Koetter *et al.*, 2008; Ariss, 2010). In addition, when the two likelihood functions converge, the Tobit approach is the same as estimating a linear regression (Coccorese & Pellecchia, 2010).

In accordance with some authoritative studies on the subject (Tobin, 1958; Carson & Sun, 2007), a standard Tobit model is as follows:

---

[4] It is imperative to clarify that Roodman (2009b) is sympathetic to the identification strategy with the argument that it is not likely for years to be endogenous after a difference. It follows that the procedure for treating *ivstyle* (years) is 'iv (years, eq(diff))' whereas the *gmmstyle* is employed for predetermined variables.

$$y_{i,t}^* = \alpha_0 + \beta X_{i,t} + \varepsilon_{i,t} \, , \qquad\qquad\qquad\qquad (3)$$

where $y_{i,t}^*$ is a latent response variable, $X_{i,t}$ is an observed $1 \times k$ vector of explanatory variables and $\varepsilon_{i,t} \approx$ i.i.d. N(0, σ^2) and is independent of $X_{i,t}$. Instead of observing $y_{i,t}^*$, we observe $y_{i,t}$:

$$y_{i,t} = \begin{cases} y_{i,t,}^* \ if \ y_{i,t}^* > \gamma \\ 0, \ if \ y_{i,t}^* \leq \gamma, \end{cases} \qquad\qquad\qquad (4)$$

where γ is a non-stochastic constant. In other words, the value of $y_{i,t}^*$ is missing when it is less than or equal to γ.

4. Empirical results

4.1 Presentation of results

The empirical results are disclosed in this section in Tables 1-3. While Tables 1-2 are concerned with GMM-centric estimations, Table 3 focuses on Tobit-oriented estimations. Concerning the first set of results, Tables 1-2 are divided into four main categories: each representing a governance variable, with political governance (consisting of two categories) captured in Table 1 while, institutional governance (i.e. also entailing two categories) captured in Table 2. In each category, three specifications are apparent. From the left-hand side to the right-hand side of each category, the elements in the conditioning information set (i.e. control variables) are increased. In other words, the first specifications entail one control variable, while the second and third are respectively characterized by two and three control variables.

To confirm the validity of the estimated models, four main information criteria are used in conformity with contemporary GMM-centric literature[5]. In the light of these information criteria, all estimated models are not valid because the null hypothesis of the Hansen test is overwhelmingly rejected. It is worthwhile to clarify that the Hansen test is robust but weakened by instrument proliferation, whereas the Sargan test is not robust but not

---

[5] "*First, the null hypothesis of the second-order Arellano and Bond autocorrelation test (AR (2)) in difference for the absence of autocorrelation in the residuals should not be rejected. Second, the Sargan and Hansen over-identification restrictions (OIR) tests should not be significant because their null hypotheses are the positions that instruments are valid or not correlated with the error terms. In essence, while the Sargan OIR test is not robust but not weakened by instruments, the Hansen OIR is robust but weakened by instruments. In order to restrict identification or limit the proliferation of instruments, we have ensured that instruments are lower than the number of cross-sections in most specifications. Third, the Difference in Hansen Test (DHT) for exogeneity of instruments is also employed to assess the validity of results from the Hansen OIR test. Fourth, a Fisher test for the joint validity of estimated coefficients is also provided*" (Asongu & De Moor, 2017, p 200).

weakened by the proliferation of instruments. Hence, a means of addressing the issue is the prefer the Hansen (which is robust) and control for the concern of instrument proliferation by ensuring that for each specification, the number of instruments is lower than the corresponding number of cross sections.

Table 1: Political governance and natural resource rents

	Dependent variable: nature resource rents					
	Political Stability/ No violence			Voice & Accountability		
Constant	-0.382	**-2.166***	**-1.273***	-0.449	**-1.738**	-0.917
	(0.200)	**(0.000)**	**(0.005)**	(0.147)	**(0.013)**	(0.137)
Resource rents (-1)	**1.039***	**1.029***	**0.967***	**1.055***	**1.019***	**0.941***
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Political Stability	-0.090	**-0.565**	**-0.769***	---	---	---
	(0.693)	**(0.023)**	**(0.000)**			
Voice & Accountability	---	---	---	0.336	**-0.912**	**-1.479***
				(0.309)	**(0.025)**	**(0.001)**
Inflation	**-0.007***	**-0.007***	**-0.007***	**-0.008***	**-0.007***	**-0.008***
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Trade Openness	----	**0.023***	**0.017***	----	**0.020***	**0.014**
		(0.001)	**(0.003)**		**(0.007)**	**(0.031)**
Foreign Direct Investment	----	---	**0.035**	----	---	**0.047***
			(0.025)			**(0.002)**
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
AR(2)	**(0.260)**	**(0.243)**	**(0.253)**	**(0.264)**	**(0.252)**	**(0.261)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	(0.013)	(0.067)	(0.033)	(0.015)	(0.037)	(0.060)
DHT for instruments						
(a)Instruments in levels						
H excluding group	(0.002)	(0.008)	(0.002)	(0.002)	(0.004)	(0.002)
Dif(null, H=exogenous)	**(0.534)**	**(0.723)**	**(0.737)**	**(0.713)**	**(0.688)**	**(0.913)**
(b) IV (years, eq(diff))						
H excluding group	---	(0.069)	**(0.191)**	---	**(0.249)**	**(0.150)**
Dif(null, H=exogenous)	---	**(0.116)**	(0.041)	---	(0.037)	(0.091)
Fisher	**2979.64***	**1743.96***	**4047.29***	**1593.39***	**1764.52***	**1399.85***
Instruments	22	26	30	22	26	30
Countries	44	43	43	44	43	43
Observations	735	699	696	735	699	696

***,**,*: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests.
Source: Authors

Having clarified the reasons for the unexpected findings, the reason for disclosing them nonetheless in this section is to avoid the concern of publication bias in social science in which strong, expected and significant findings are preferred over weak, unexpected and insignificant results (Rosenberg, 2005; Franco, Malhotra & Simonovits, 2014; Boateng et al., 2018; Ejemeyovwi & Osabuohien, 2020).

Table 2: Institutional governance and natural resource rents

	Dependent variable: nature resource rents					
	Rule of Law			**Corruption control**		
Constant	-0.330	**-2.284***	**-1.709**	0.005	**-1.991**	**-1.481***
	(0.161)	**(0.003)**	**(0.010)**	(0.979)	**(0.012)**	**(0.007)**
Resource rents (-1)	**1.004***	**0.978***	**0.909***	**1.014***	**1.024***	**0.946***
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Rule of Law	-0.668	**-1.961***	**-2.350***	---	---	---
	(0.228)	**(0.000)**	**(0.000)**			
Corruption control		---	---	0.015	-0.789	**-1.726***
				(0.974)	(0.125)	**(0.000)**
Inflation	**-0.007***	**-0.007***	**-0.007***	**-0.006***	**-0.007***	**-0.007***
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Trade Openness	----	**0.023***	**0.021***	----	**0.021***	**0.016***
		(0.006)	**(0.002)**		**(0.004)**	**(0.002)**
Foreign Direct Investment	----	---	**0.034***	----	---	**0.045***
			(0.003)			**(0.001)**
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	**(0.256)**	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
AR(2)	(0.001)	**(0.246)**	**(0.257)**	**(0.272)**	**(0.245)**	**(0.253)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	(0.008)	(0.071)	(0.058)	(0.007)	(0.036)	(0.053)
DHT for instruments						
(a)Instruments in levels						
H excluding group	(0.001)	(0.004)	(0.003)	(0.001)	(0.004)	(0.003)
Dif(null, H=exogenous)	**(0.661)**	**(0.939)**	**(0.883)**	**(0.480)**	**(0.647)**	**(0.839)**
(b) IV (years, eq(diff))						
H excluding group	---	**(0.195)**	**(0.211)**	---	**(0.174)**	**(0.175)**
Dif(null, H=exogenous)	---	(0.079)	(0.069)	---	(0.042)	(0.072)
Fisher	**2447.64***	**1369.52***	**1707.22***	**2069.24***	**1674.14***	**2174.46***
Instruments	22	26	30	22	26	30
Countries	44	43	43	44	43	43
Observations	735	699	696	735	699	696

***,**,*: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests.
Source: Authors

It is apparent from the Tobit results disclosed in Table 3 that the governance variables have a negative effect on natural resource rents. Moreover, from the marginal effects, on average for the sampled countries, a unit increase in each governance dynamic consistently decreases natural resource rents. It is also worth noting that the main impacts and marginal effects are respectively higher from the institutional governance predictors than they are for the political governance predictors. Moreover, all the significant control variables have the expected signs.

Given that compared to the standard Tobit regressions, the GMM technique controls for simultaneity (i.e. through internal instruments) and the unobserved heterogeneity (i.e. year fixed effects) dimensions of endogeneity, we extend the Tobit regression to account for simultaneity (i.e. using lagged independent variables) and the unobserved heterogeneity (i.e.

using time fixed effects). Table 4 summarizes these new findings that are consistent with those of Table 3.

Table 3: Governance and natural resource rents (Tobit regressions)

	Dependent variable: nature resource rents							
	Political Governance				Institutional Governance			
	Political Stability		Voice & Accountability		Rule of Law		Corruption control	
	Coefficient	dy/dx	Coefficient	dy/dx	Coefficient	dy/dx	Coefficient	dy/dx
Constant	1.884	---	1.046	---	-2.012	---	**-2.613****	
	(0.142)		(0.335)		(0.123)		**(0.043)**	
Political Stability	**-6.185****	**-5.326****	---	---	---	---	---	---
	(0.000)	**(0.000)**						
Voice & Account	---	---	**-9.118****	**-7.832****	---	---	---	---
			(0.000)	**(0.000)**				
Rule of Law	---	---	---	---	**-10.791****	**-9.278****	---	---
					(0.000)	**(0.000)**		
Corruption control	---	---	---	---	---	---	**-11.746****	**-10.109****
							(0.000)	**(0.000)**
Inflation	-0.0002	-0.0002	0.0004	0.0003	-0.0007	-0.0006	0.0003	0.0003
	(0.955)	(0.955)	(0.932)	(0.932)	(0.867)	(0.867)	(0.930)	(0.930)
Trade Openness	**0.106****	**0.091****	**0.091****	**0.078****	**0.103****	**0.089****	**0.110****	**0.094****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Foreign Investment	**0.090***	**0.078***	**0.107****	**0.092****	0.067	0.057	**0.090***	**0.077***
	(0.076)	**(0.076)**	**(0.023)**	**(0.023)**	(0.158)	(0.158)	**(0.050)**	**(0.050)**
Fisher	**45.99****		**68.50****		**99.37****		**99.35****	
Observations	735	735	735	735	735	735	735	735

***,**,*: significance levels at 1%, 5% and 10% respectively.Voice & Account: Voice and Accountability.
Source: Authors

Table 4: Extended Tobit regressions (addressing simultaneity and unobserved heterogeneity)

	Dependent variable: nature resource rents							
	Political Governance				Institutional Governance			
	Political Stability		Voice & Accountability		Rule of Law		Corruption control	
	Coefficient	dy/dx	Coefficient	dy/dx	Coefficient	dy/dx	Coefficient	dy/dx
Constant	**3.093****	---	**2.324***	---	-0.684	---	-1.719	---
	(0.032)		**(0.057)**		(0.628)		(0.227)	
Political Stability (-1)	**-5.777****	**-4.982****	---	---	---	---	---	---
	(0.000)	**(0.000)**						
Voice & Account (-1)	---	---	**-8.800****	**-7.572****	---	---	---	---
			(0.000)	**(0.000)**				
Rule of Law (-1)	---	---	---	---	**-10.329****	**-8.894****	---	---
					(0.000)	**(0.000)**		
Corruption control (-1)	---	---	---	---	---	---	**-11.334****	**-9.767****
							(0.000)	**(0.000)**
Inflation (-1)	0.003	0.003	0.004	0.003	0.003	0.002	0.003	0.003
	(0.193)	(0.192)	(0.182)	(0.182)	(0.281)	(0.280)	(0.166)	(0.165)
Trade Openness (-1)	**0.090****	**0.077****	**0.076****	**0.066****	**0.090****	**0.077****	**0.096****	**0.083****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Foreign Investment (-1)	**0.151****	**0.130****	**0.159****	**0.137****	**0.123****	**0.106****	**0.151****	**0.130****
	(0.003)	**(0.003)**	**(0.001)**	**(0.001)**	**(0.008)**	**(0.008)**	**(0.001)**	**(0.001)**
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fisher	**16.06****		**21.16****		**28.83****		**29.02****	
Observations	692	692	692	692	692	692	692	692

***,**,*: significance levels at 1%, 5% and 10% respectively. Voice & Account: Voice and Accountability. (-1): lagged or non-contemporary by one year.
Source: Authors

4.2 Further discussion of results: clarifying the paradox

4.2.1 Clarifying the paradox

It is apparent from the results that the tested hypothesis is not valid because political and institutional governance, instead of increasing natural resource rents, have the opposite effect.

In light of the motivation for the study, this paradox can be explained by the fact that the attendant governance indicators are negatively skewed and hence should be qualified as bad governance, instead of good governance. From the summary statistics disclosed in the appendix, the negative skewness of the governance data is apparent from two main perspectives: (i) the mean values are consistently negative and (ii) the magnitudes of the minimum negative values are consistently higher than the corresponding magnitudes of maximum positive values. It follows that if the skewness of the data is taken into account in the conception and definition of engaged variables: (i) "political stability" would be renamed "political instability"; (ii) "voice & accountability" should be "lack of voice and accountability"; (iii) "rule of law" should be "absence of rule law" and (iv) "corruption control" should read "lack of corruption control".

This understanding of the skewness in governance variables in order to comprehensively interpret their corresponding estimates in macroeconomic analysis is consistent with: (i) Asongu and Odhiambo (2021) in clarifying the nexus between governance and environmental sustainability and (ii) Bhattacharyya and Hodler (2014) on the stance that weak political governance reduces natural resource rents.It what follows, the findings are further explained in the light of the paradox with emphasis on specific components of the attendant governance dynamics.

4.2.2 Poor governance-low natural resource rents

In this section, the study clarifies why poor political and institutional governance can be associated with a reduction in natural resource rents. This clarification is broadly consistent with the narrative of Asongu and Odhiambo (2019) on linkages between governance and industrialization.

First, with respect to poor political governance, it should be noted that it has been substantially documented that such lack of good political governance is associated with diminished prospects of industrialization (Collier, Hoeffler & Pattillo, 2004; Davies, 2008; Ndikumana, Boyce & Ndiaye, 2015) owing to, *inter alia*: capital flight and loss/damage of

assets which can be very unfavorable to domestic economic growth especially if the underlying losses/damages are associated with the natural resource sector of a resource-wealthy country. It is worthwhile to substantiate the above perspective by decoupling poor political governance into its constituent components: political instability/ violence and "lack of voice & accountability".

(i) When political instability and violence are apparent in a resource-wealthy economy, it is highly probable that investors in the resource-rich sector would decrease their investments in the corresponding sector and, by extension, a reduction in natural resource rents. Contemporary case studies which can be used to illustrate this tendency include: (i) Nigeria with the attacks of the Movement for the Emancipation of the Niger Delta (Yeeles & Akporiaye, 2016; Ezirim, 2018) and (ii) South Sudan with the recent political crisis owing to a power dispute (Grigoli, Herman & Swiston, 2019).

(ii) On the front of the absence of "voice & accountability", the political strife and violence underlying the poor political governance is linked with the absence of executive accountability and competitive elections which only motivate investors in the natural resource sector to reduce their investments in the sector because such investments are deemed as more risky (Lensink, Hermes & Murinde, 2000; Le & Zak, 2006). Consequently, such investments are transferred to countries in which political institutions are more credible and stable because investors have been documented to prefer investing in macroeconomic environments that are characterized by less ambiguity (Kelsey & le Roux, 2017, 2018).

In the light of the above, the absence of political stability and "voice & accountability" can severely constrain the ability of investors to carry on with their investment activities and, by extension, natural resource rents associated with the fruits of such investments in countries rich in natural resources would naturally decrease. It follows that, like most investors, natural resource investors react negatively to events that are unfavorable to their return on investments.

Second, on the front of poor institutional governance (i.e. composed of the absence of a stringent rule of law and lack of corruption control), it should be expected that when the citizens and the State do not respect institutions that govern interactions between them, investors in the natural resource sector (as well as the confidence of investors)are unfavourably affected and by extension, investments from these corresponding investors are bound to substantially decrease and hence the associated natural resource rents. There is a

substantial body of literature on the position that, in the absence of stringent laws, elite corruption decreases investments owing to state predation, regardless of whether or not investors are directly related to such corruption and predation. In essence, the mainstream perspectives that investors prefer investing in countries with better accounting standards (La Porta, Lopez-de-Silanes, Shleifer & Vishny, 1998), more effective courts (Djankov, La Porta, Lopez-de-Silanes & Shleifer, 2003), good institutions characterised by less corruption (La Porta, Lopez-de-Silanes, Shleifer & Vishny, 1999), have been confirmed in contemporary African institutional literature (Asongu, 2012; Fowowe, 2014; Ibrahim & Alagidede, 2017).

It follows from the above arguments that the rule of law facilitates the protection of private property and, by extension, provides some guarantee against the expropriation of investors and corresponding invested assets. The risks of such expropriation can substantially undermine investors in the natural resource sector of resource-wealthy countries. Moreover, the negative reaction of investors and corresponding unfavourable incidence on natural resource rents can be more apparent when such expropriation is compounded by corrupt executives owing to the absence effective measures of corruption control.

Overall, the findings are consistent with time and level underpinnings for the benefit of governance in developing countries (Sung, 2004; Keefer, 2007; Back & Hadenius, 2008; Asongu, 2014). According to the attendant underpinnings, governance in Africa is poor because democracies in the continent are still weak (i.e. level view) and young (i.e. time perspective).

5. Conclusion and future research directions

The paradox of governance and natural resource rents builds on the fact that while the governance measures from the World Governance Indicators (WGI) of the World Bank capture both positive and negative signals, they are conceived and considered as good governance indicators. These juxtaposition and conflation are misleading, especially for countries with poor governance standards. This study assesses nexuses between governance and natural resource rents in 44 countries in Sub-Saharan Africa using data for the period 1996-2016. The empirical evidence is based on Tobit regressions and the Generalised Method of Moments. The GMM results are reported essentially for the purpose of avoiding publication bias: a practice of preferring strong, significant and expected results over weak, insignificant and unexpected results. The Tobit findings show that political governance (entailing "voice & accountability" and political stability) and institutional governance (consisting of the rule of law and corruption control) have a negative effect on resource rents.

However, if the conception and definition of attendant governance variables are understood within the framework that such variables are negatively skewed, it becomes apparent that bad governance reduces resource rents. This conclusion clarifies the paradox because negatively skewed governance variables are understood as representing poor governance. By extension, the negative effect of the rule of law or corruption control on natural resource rents should be the negative effect of the absence of rule of law or lack of corruption control on natural resource rents. The paradox is further clarified in the light of specific components of the governance dynamics. The contribution of the study is, therefore, to clarify a paradox and hence, highlight the need for governance measures to be classified in terms of good governance and bad governance measures.

It follows from the above that because governance indicators are positively and negatively skewed, they should be conceived distinctly as poor governance for some countries and good governance for other countries and not simply as governance which is conflated with "good governance". In this light, the effects of governance on outcome variables are contingent on whether they are positively or negatively skewed. By extension, the expected signson an outcome variable can be apparent because the governance variables are positively skewed, while they may also be unexpected because the governance variables are negatively skewed. Based on the arguments clarifying the paradox, political stability should entail positive scores while political instability should entail negative scores. Hence, weak scores of political stability should be understood as "weak political stability", not "political instability".

The study has also established that the main impacts and marginal effects are respectively higher from the institutional governance predictors than they are for the political governance predictors. This tendency for institutional governance to comparatively have a higher incidence on outcome variables is consistent with contemporary literature on fighting software piracy in Africa (Andrés & Asongu, 2013) and mitigating conflicts and crimes in the same continent (Asongu & Kodila-Tedika, 2016). Institutional governance is more relevant than political governance in determining natural resource rents because the former is a kind of "last resort" in boosting natural resource rents from resource-wealthy countries. In essence, government officials can be elected to office by means of majority vote through various unhealthy mechanisms such as vote-buying and intimidation (i.e. poor political governance); however, the effect on natural resources rents is more apparent when those elected into office and other government officials do not respect government institutions (i.e. poor institutional governance) that govern interactions between these citizens and the government.

It is worthwhile clarifying that the explanation of the paradox in terms of negative

skewness is relative to developed countries which are characterized by higher governance standards that are positively skewed. However, putting a comparative framework aside, in absolute terms (i.e. when only the sampled countries are taken into account), the explanation of the paradox does not hold because governance indicators as compiled by the World Bank are standardized in order for each of the indicators to have a mean value of zero and a standard deviation of 1.00. Hence, the negative skewness does not affect the econometric results in absolute terms. This is essentially because even when mean values are negative, higher values still represent better indicators of the corresponding governance dynamic.

It is also important to note that the proposed categorization of governance variables into positive and negative values is a policy recommendation. We have not categorized the values into positive and negative in the empirical analysis. Hence, whether the proposed categorization solves the paradox is a matter of future research and further empirical scrutiny. Another worthwhile argument with which to explain the paradox is that governance has more impact on the nonresource component of GDP given that the natural resource variable is rents relative to GDP.

The purpose of applied economics is to accept or reject existing theories and/or stated claims. Whether the underpinnings are accepted or rejected by the data does not make scientific process worthless unless it is a replication exercise. In our case, the underlying hypothesis is largely not validated and we have provided insights into why the hypothesis is not validated. Publication bias is the preference by authors, referees and editors of significant/strong/expected results over insignificant /weak/unexpected results. Our research and findings are not guided by such publication bias.

Future studies can extend the findings established in this study by assessing whether/how they withstand empirical scrutiny within country-specific frameworks. This future research direction is also motivated by the fact that cross-country differences existing in terms of governance and initial conditions of some countries may reflect different tendencies in terms of the response of natural resource rents to governance measures. Moreover, while this study is focused on Sub-Saharan Africa, it would be worthwhile to assess if the clarification of the underlying paradox withstands empirical scrutiny in other developing countries.

Appendices

Appendix 1: Definitions of Variables

Variables	Signs	Definitions of variables (Measurements)	Sources
Resources rents	Rrents	Total natural resources rents (% of GDP)	WDI
Political Stability	PS	"Political stability/no violence (estimate): measured as the perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional and violent means, including domestic violence and terrorism"	WGI
Voice & Accountability	VA	"Voice and accountability (estimate): measures the extent to which a country's citizens are able to participate in selecting their government and to enjoy freedom of expression, freedom of association and a free media"	WGI
Rule of Law	RL	"Rule of law (estimate): captures perceptions of the extent to which agents have confidence in and abide by the rules of society and in particular the quality of contract enforcement, property rights, the police, the courts, as well as the likelihood of crime and violence"	WGI
Corruption control	CC	"Control of corruption (estimate): captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests".	WGI
Inflation	Infl	Inflation, GDP Deflator (% of annual)	WDI
Trade	Trop	Imports plus Exports of Commodities (% of GDP)	WDI
Foreign Investment	Fodi	Foreign direct investment, net inflows (% of GDP)	WDI

WGI: World Governance Indicators. WDI: World Bank Development Indicators of the World Bank.
Source: Authors

Appendix 2: Summary statistics (1996-2016)

	Mean	SD	Minimum	Maximum	Observations
Resources rents	12.864	12.520	0.001	84.239	906
Political Stability	-0.455	0.879	-2.844	1.282	792
Voice & Accountability	-0.529	0.720	-2.226	1.007	792
Rule of Law	-0.663	0.644	-2.129	1.077	792
Corruption control	-0.598	0.623	-1.805	1.216	792
Inflation	19.436	184.903	-31.565	4800.532	908
Trade Openness	55.716	29.290	7.805	225.412	910
Foreign Investment	5.045	10.430	-8.589	161.823	906

S.D: Standard Deviation.
Source: Authors

Appendix 3 : Correlation matrix (uniformsample size: 735)

	Rrents	PS	VA	RL	CC	Inflation	Trade	Foreign I.
Rrents	1.000							
PS	-0.341	1.000						
VA	-0.482	0.644	1.000					
RL	-0.508	0.771	0.830	1.000				
CC	-0.526	0.667	0.721	0.877	1.000			
Inflation	0.040	-0.127	-0.092	-0.104	-0.084	1.000		
Trade	0.214	0.307	0.175	0.211	0.241	-0.038	1.000	
Foreign I .	0.156	0.061	0.041	0.012	0.050	-0.018	0.363	1.000

Rrents : Natural resource rents.PS : Political Stability. VA : Voice & Accountability. RL : Rule of Law. CC: Corruption control. Foreign I: Foreign Investment.

Source: Authors

References

Ajide, K. B, & Raheem, I. D., (2016a). "Institutions-FDI Nexus in ECOWAS Countries", *Journal of African Business*, 17(3), pp. 319-341.

Ajide, K. B, & Raheem, I. D., (2016b). "The Institutional Quality Impact on Remittances in the ECOWAS Sub-Region", *African Development Review*, 28(4), pp. 462–481.

Ajide, K. B., Raheem, I. D., & Asongu, S. A., (2019). "Dollarization and the "Unbundling" of Globalization in sub-Saharan Africa", *Research in International Business and Finance*, 47 (January), pp. 398-409.

Al-Marhubi, F. (2020). "Do natural resource rents reduce labour shares? Evidence from panel data". *Applied Economics Letters*, DOI: 10.1080/13504851.2020.1853666.

Amavilah, V, Asongu, S. A., & Andrés, A. R., (2017). "Effects of globalization on peace and stability: Implications for governance and the knowledge economy of African countries". *Technological Forecasting and Social Change*, 122 (September), pp. 91-103.

Amiri, H., Samadian, F., Yahoo, M., & Jamali, S. J. (2019). "Natural resource abundance, institutional quality and manufacturing development: Evidence from resource-rich countries". *Resources Policy*, 62(August), pp.550-560.

Andrés, A. R., & Asongu, S. A., (2013). "Fighting software piracy: which governance tools matter in Africa?" *Journal of Business Ethics*, 118(3), pp. 667-682.

Andrés, R. A., Asongu, S. A., & Amavilah, V. H., (2015). "The Impact of Formal Institutions on Knowledge Economy". *Journal of the Knowledge Economy*, 6(4), pp. 1034-1062.

Arellano, M., & Bover, O., (1995). "Another look at the instrumental variable estimation of error components models". *Journal of Econometrics,* 68(1), pp. 29-52.

Arezki, R., & Brückner, M. (2011). "Oil rents, corruption, and state stability: Evidence from panel data regressions". *European Economic Review*, 55(7), pp. 955-963.

Ariss, R. T., (2010). "On the Implications of Market Power in Banking: Evidence from Developing Countries", *Journal of Banking and Finance*, 34(4), pp. 765-775.

Asongu, S. A., (2012). "Law and finance in Africa", *Brussels Economic Review*, 55(4), pp. 385-408.

Asongu, S. A., (2014). "Finance and Democracy in Africa". *Institutions and Economies*, 6(3), pp. 92-118.

Asongu, S. A., (2015). "On Taxation, Political Accountability and Foreign Aid: Empirics to a Celebrated Literature", *South African Journal of Economics*, 83(2), pp. 180-198.

Asongu, S. A., & De Moor, L., (2017). "Financial globalisation dynamic thresholds for financial development: evidence from Africa". *European Journal of Development Research,* 29(1), pp. 192–212.

Asongu, S. A., & Kodila-Tedika, O., (2016)."Fighting African Conflicts and Crime: Which Governance Tools Matter?"*International Journal of Social Economics*, 43(5), pp. 466-485.

Asongu, S. A., & Kodila-Tedika, O., (2017). "Trade, aid and terror", International Journal of Development Issues, 16(1), pp. 2-24.

Asongu, S. A., & Nnanna, J., (2019). "Foreign Aid, Instability, and Governance in Africa", *Politics & Policy*, 47(4), pp. 807-848.

Asongu, S. A., & Odhiambo, N. M., (2019). "Governance, capital flight and industrialisation in Africa", *Journal of Economic Structures*, 8(1), pp. 1-22.
DOI: 10.1186/s40008-019-0170-2.

Asongu, S. A., & Odhiambo, N. M., (2020a). "Insurance Policy Thresholds for Economic Growth in Africa", *European Journal of Development Research*, 32(3), pp. 672–689.

Asongu, S. A., & Odhiambo, N. M., (2020b). "Economic Development Thresholds for a Green Economy in Sub-Saharan Africa". *Energy Exploration & Exploitation,*38(1), pp. 3-17.

Asongu, S. A., & Odhiambo, N. M., (2020c). "Governance, CO2 emissions and inclusive human development in sub-Saharan Africa". *Energy Exploration & Exploitation,* 38(1), pp. 18-36.

Asongu, S. A., & Odhiambo, N. M., (2021). "Enhancing Governance for Environmental Sustainability in Sub-Saharan Africa", *Energy Exploration &Exploitation*, 36(1), pp. 444-463.

Beck. T., Demirgüç-Kunt, A., & Levine, R., (2003). "Law and finance: why does legal origin matter?" *Journal of Comparative Economics,* 31(4), pp. 653-675.

Back, H., & Hadenius, A., (2008). "Democracy and State Capacity: Exploring a J-Shaped Relationship". *Governance,* 21(1), pp. 1-24.

Badeep, R. A., Lean, H. H., & Clark, J., (2017). "The evolution of the natural resource curse

thesis: A critical literature survey", *Resource Policy*, 51(March), pp. 123-134.

Bahmani-Oskooee, M., & Gelan, A., (2018). "Exchange-rate volatility and international trade performance: Evidence from 12 African countries", *Economic Analysis and Policy*, 58(June), pp. 14-21.

Barro, R. J., (1999). "Determinants of Democracy", *Journal of Political Economy*, 107(S6): 158–S183.

Bhattacharyya, S., & Hodler, R. (2010). "Natural resources, democracy and corruption", *European Economic Review*, 54(4), pp. 608-621.

Bhattacharyya, S., & Hodler, R. (2014). "Do natural resource revenues hinder financial development? The role of political institutions",*World Development*, 57 (May), pp. 101–113.

Bhattacharyya, S., & Keller, M., (2020). "Resource Discovery and the Political Fortunes of NationalLeaders", *Economica*, 88, pp.129-166.

Blanas, S., & Seric, A., (2018). "Determinants of intra-firm trade: Evidence from foreign affiliates in Sub-Saharan Africa", *Review of International Economics*, 26(4), pp. 917-956.

Boateng, A., Asongu, S., Akamavi, R., & Tchamyou, V., (2018). "Information asymmetry and market power in the African banking industry". *Journal of Multinational Financial Management,* 44(March), pp. 69-83.

Boschini, A. D., Pettersson, J., & Roine, J. (2007). "Resource Curse or Not: A Question of Appropriability", *Scandinavian Journal of Economics*, 109(3), pp. 593–617.

Brunnschweiler, C. N. (2008). "Cursing the blessings? Natural resource abundance, institutions, and economic growth". *World Development*, 36(3), pp. 399-419.

Bruno, G., De Bonis, R., & Silvestrini, A., (2012). "Do financial systems converge? New evidence from financial assets in OECD countries". *Journal of Comparative Economics,* 40(1), pp. 141-155.

Carson, R. T., & Sun, Y., (2007)."The Tobit model with a non-zero threshold", *Econometrics Journal*, 10(3), pp. 488-502.

Cassidy, T., (2019). "The Long-Run Effects of Oil Wealth on Development: Evidence from Petroleum Geology."*The Economic Journal*, 129(623), pp. 2745–2778.

Cipollina, M., Demaria, F., & Filomena Pietrovito, F., (2016). "Determinants of Trade: the Role of Innovation in Presence of Quality Standards", *Journal of Industry, Competition and Trade*, 16(4), pp. 455–475.

Coccorese, P., & Pellecchia, A., (2010). "Testing the 'Quiet Life' Hypothesis in the Italian Banking Industry", *Economic Notes by BancadeiPaschi di Siena SpA*, 39(3), pp. 173-202.

Collier, P., & Hoeffler, A. (2005). "Resource Rents, Governance, and Conflict",*Journal of Conflict Resolution*, 49(4), pp. 625–633.

Collier, P., & Hoeffler, A. (2009). "Testing the neocon agenda: democracy in resource-rich societies", *European Economic Review*, 53(3), pp. 293-308.

Collier, P., Hoeffler, A. & Pattillo, C., (2004). "Africa's Exodus: Capital Flight and the Brain Drain as Portfolio Decisions". *Journal of African Economies*, 13 (2), pp. 15-54.

Dary, S., & James Jr, H., (2018). "Trade credit supply in African agro-food manufacturing industry: determinants and motives", *Agricultural Finance Review*, 78(3), pp. 312-329.

Davies, V. (2008), "Post-war Capital Flight and Inflation". *Journal of Peace Research*, 45(4),pp. 519-537.

De Haan., J., & Siermann, C. L. J., (1996). "Political Instability, Freedom, and Economic Growth: Some Further Evidence", *Economic Development and Cultural Change*, 44(2), pp. 339-350.

Dhillon, A., Krishnan, P., Patnam, M., & Perroni, C., (2020). 'Secession with Natural Resources'. *Economic Journal*, 130(631), pp. 2207–2248.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., &Shleifer, A., (2003). "Courts", *Quaterly Journal of Economics*, 118(2), pp. 453-517.

Ejemeyovwi, J. O., & Osabuohien, E. S., (2020). "Investigating the relevance of mobile technology adoption on inclusive growth in West Africa", *Contemporary Social Science*, 15(1), pp. 48-61.

Eubank, N., (2012). "Taxation, Political Accountability and Foreign Aid: Lessons from Somaliland", *Journal of Development Studies*, 48(4), pp. 465-480.

Ezirim, G. E., (2018)."Oil crimes, national security, and the Nigerian state, 1999-2015". *Japanese Journal of Political Science*, 19(1), pp. 80-100.

Fagbemi, F., &Adeoye, G. O., (2020). "Nigerian Governance Challenge: Exploring the Role of Natural Resource Rents". *Global Journal of Emerging Market Economies*, 12(3),pp. 335-358.

Fonchamnyo, D. C., & Akame, A. R., (2017). "Determinants of export diversification in Sub-Sahara African region: a fractionalized logit estimation model",*Journal of Economics and Finance*, 41, pp. 330–342.

Fowowe, B., (2014). "Law and Finance Revisited: Evidence from African Countries", *South African Journal of Economics*, 82(2), pp.193–208.

Franco, A., Malhotra, N., & Simonovits, G., (2014). "Publication Bias in the Social Sciences: Unlocking the File Drawer", *Science*, 345(6203), pp. 1502-1505.

Frankel, J. A. (2012). "The Natural Resource Curse: A Survey of Diagnoses and Some Prescriptions". Working Paper Series rwp12-014, Harvard University, John F. Kennedy School of Government.

Grigoli, F., Herman, A., & Swiston, A., (2019). "A crude shock: Explaining the short-run impact of the 2014–16 oil price decline across exporters", Energy Economics, 78(February), pp. 481-493.

Guan, J., Kirikkaleli, D., Bibi, A., & Zhang, W., (2020). "Natural resources rents nexus with financial development in the presence of globalization: Is the "resource curse" exist or myth?"*Resources Policy*, 66, June 2020, 101641.

Henri, P. A. O. (2019). "Natural resources curse: A reality in Africa". *Resources Policy*, 63 (October), 101406.

Hodler, R. (2006). "The curse of natural resources in fractionalized countries". *European Economic Review*, 50(6), pp. 1367-1386.

Horvath, R. , & Zeynalov, A., (2014). "The Natural Resource Curse in Post-Soviet Countries: The Role of Institutions and Trade Policies", IOS Working Papers 341, Institute for East and Southeast European Studies.

Ibrahim, M., & Alagidede, P., (2017). "Financial Development, Growth Volatility and Information Asymmetry in sub–Saharan Africa: Does Law Matter?", *South African Journal of Economics*, 84(4), pp. 570-588.

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

Jensen, N., & Wantchekon, L. (2004). "Resource Wealth and Political Regimes in Africa". *Comparative Political Studies*, 37(9), pp. 816–841.

Kaminchia, S. M., (2019). "The Determinants of Trade Costs in the East African Community", *Journal of Economic Integration*, 34(1), pp. 38-85.

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

Keefer, P., (2007). "Clientelism, Credibility, and the Policy Choices of Young Democracies". *American Journal of Political Science,* 51 (4), pp. 804-821.

Kelsey, D., & le Roux, S., (2017), "Dragon Slaying with Ambiguity: Theory and Experiments". *Journal of Public Economic Theory*, 19(1), pp. 178–197.

Kelsey, D., & le Roux, S., (2018). "Strategic Ambiguity and Decision-making. An Experimental Study". *Theory and Decision*, 84(3), pp. 387–404.

Koetter, M., & Vins, O., (2008). "The Quiet Life Hypothesis in Banking-Evidence from German Savings Banks", Department of Finance, Goethe University, *Working Paper Series: Finance and Accounting* No. 190, Frankfurt.

Kou, G., Chao, X., Peng, Y., & Alsaadi, F. E., (2019a). "Machine learning methods combined with financial systemic risk". *Technological and Economic Development of Economy*, DOI:https://doi.org/10.3846/tede.2019.8740(accessed 01 December 2019).

Kou, G., Yang, P., Xiao, F., Chen, Y., & Alsaadi, F. E., (2019b). "Evaluation of feature selection methods for text classification with small datasets using multiple criteria decision-making methods". *Applied Soft Computing*, DOI:https://doi.org/10.1016/j.asoc.2019.105836.(accessed 01 December 2019).

Kou, G., Ergu, D., Chen, Y., & Lin, C., (2016). "Pairwise comparison matrix in multiple criteria decision making". *Technological and Economic Development of Economy,* 22(5), pp. 738-765.

Kou, G., Lu, Y., Peng, Y., & Shi, Y., (2012). "Evaluation of Classification Algorithms using MCDM and Rank Correlation". *International Journal of Information Technology & Decision Making,* 11(1), pp. 197-225.

Kou, G., Peng, Y., & Wang, G., (2014). "Evaluation of clustering algorithms for financial risk analysis using MCDM methods". *Information Sciences,* 275(August), pp. 1-12.

Kumbhakar, S. C., & Lovell, C. A. K., (2000).*Stochastic Frontier Analysis*, Cambridge MA: Cambridge University Press.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R.W., (1998). "Law and finance", *Journal of Political Economy*, 106(6), pp. 1113-1155.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., &Vishny, R.W., (1999). "The quality of government", *Journal of Law, Economics and Organization*, 15(1), pp.222-279.

Le, Q. V., & Zak. P. J., (2006). "Political risk and capital flight". *Journal of International Money and Finance*, 25(2), pp. 308-329.

Lensink, R., Hermes, N., & Murinde. V., (2000). "Capital flight and political risk". *Journal of International Money and Finance*, 19(1), pp. 73-92.

Mamo, N., Bhattacharyya, S., & Moradi, A., (2019)."Intensive and extensive margins of mining and development: Evidence from Sub-Saharan Africa". *Journal of Development Economics*, 139(1), pp. 28-49.

Mavrotas, G., Murshed, S. M., & Torres, S. (2011). "Natural resource dependence and economic performance in the 1970–2000 period". *Review of Development Economics*, 15(1), pp. 124- 138.

McGuire, M. C. & Olson, M. (1996). "The Economics of Autocracy and Majority Rule: The Invisible Hand and the Use of Force". *Journal of Economic Literature*, 34(1), pp. 72-96.

Mehlum, H., Moene, K., & Torvik, R. (2006). "Institutions and the resource curse",*Economic Journal*, 116(508), pp. 1-20.

Meniago, C., & Asongu, S. A., (2018). "Revisiting the finance-inequality nexus in a panel of African countries". *Research in International Business and Finance,* 46(December), pp. 399-419.

Mignamissi, D., & Kuete Y. F. M, (2021). Resource rents and happiness on a global perspective: The resource curse revisited, *Resource Policy*, 71(June), 101994.

Mohamed, E. S. E. (2020). "Resource Rents, Human Development and Economic Growth in Sudan*". Economies*, 8(4), 99. https://doi.org/10.3390/economies8040099

Muhanji, S., Ojah, K., & Soumaré, I. (2019). "How do natural resource endowment and institutional quality influence the nexus between external indebtedness and welfare in Africa?" *Economic Systems*, 43(1), pp. 77-98.

Ndikumana, L., Boyce, J. & Ndiaye, A.S. (2015). "Capital Flight: Measurement and Drivers", in Ajayi, S. I. and L. Ndikumana (Eds), Capital Flight from Africa: Causes, Effects, and Policy Issues, Oxford: Oxford University Press, 15-54.

Nwokora, Z., & Pelizzo, R., (2018). "Measuring Party System Change: A Systems Perspective", *Political Studies*, 66(1), pp. 100-118.

Olson, M. (1991). Autocracy, Democracy, and Prosperity. In R. J. Zeckhauser, (Ed.), Strategy and Choice, second edition, 131-157. Cambridge: MIT Press.

Osabuohien, E. S., & Efobi, U. R., (2013). "Africa's money in Africa". *South African Journal of Economics,* 81(2), pp. 292-306.

Opeyemi, A., Uchenna, E., Asongu, S., & Osabuohein, E. (2019). "Renewable Energy, Trade Performance and the Conditional Role of Finance and Institutional Capacity in sub-Sahara African countries". *Energy Policy*, 132(September), pp. 490-498

Pelizzo, R., Araral, E., Pak, A., & Xun, W., (2016). "Determinants of Bribery: Theory and Evidence from Sub- Saharan Africa", *African Development Review*, 28(2), pp. 229-240.

Pelizzo, R., & Nwokora, Z., (2016). "Bridging the Divide: Measuring Party System Change and Classifying Party Systems", *Politics & Policy*, 44(6), pp. 1017-1052.

Pelizzo, R., & Nwokora, Z., (2018). "Party System Change and the Quality of Democracy in East Africa", *Politics & Policy*, 46(3), pp. 505-528.

Robinson, J. A., Torvik, R., & Verdier, T. (2006). "Political foundations of the resource curse". *Journal of Development Economics*, 79(2), pp. 447-68.

Roodman, D., (2009a). "A Note on the Theme of Too Many Instruments". *Oxford Bulletin of Economics and Statistics,* 71(1), pp. 135-158.

Roodman, D., (2009b). "How to do xtabond2: An introduction to difference and system GMM in Stata". *Stata Journal,* 9(1), pp. 86-136.

Rosenberg, M. S., (2005). "The file-drawer problem revisited: a general weighted method for

calculating fail-safe numbers in meta-analysis", *Evolution*, 59(2), pp. 464-468.

Ross, M. L., (2001)."Does oil hinder democracy?"*World Politics*, 53(3), pp. 325-361.

Ross, M. L., (2007). How Mineral-Rich States Can Reduce Inequality, Chapter 9 in Escaping the Resource Curse, edited by M.Humphreys, J.Sachs and J.Stiglitz (Columbia University Press: NY), 236-255.

Sachs, J., & Warner, A.M., (1995). "Natural Resources Abundance and economic growth". National bureau for Economic Research, *NBER Working Paper* No. 5398, Cambridge.

Sala-i-Martin, X., & Subramanian, A., (2013). "Addressing the natural resource curse: An illustration from Nigeria". *Journal of African Economies*,22(4), pp. 570–615.

Sarmidi, T., Law S. H., & Jafari, Y., (2014). "Resource curse: new evidence on the role of institutions". *International Economic Journal*, 28(1), pp. 191-206.

Shaxson, N.(2007). Poisoned Wells: The Dirty Politics of African Oil. New York: Palgrave Mcmillan.

Sinha, A., & Sengupta, T. (2019). "Impact of natural resource rents on human development: what is the role of globalization in Asia Pacific countries?" *Resources Policy*, 63, 101413.

Sung, H. E., (2004). "Democracy and political corruption: a cross-national comparison". *Crime, Law and Social Change*, 41(2004), pp. 179–194.

Tadadjeu, S., Njangang, H., Ningaye, P., & Nourou, M. (2020). Linking natural resource dependence and access to water and sanitation in African countries. *Resources Policy*, 69, 101880.

Tchamyou, V. S., (2020). "Education, Lifelong learning, Inequality and Financial access: Evidence from African countries". *Contemporary Social Science*,15(2), pp. 7-25

Tchamyou, V. S., (2019). "The Role of Information Sharing in Modulating the Effect of Financial Access on Inequality". *Journal of African Business,* 20(3), pp. 317-338.

Tchamyou, V. S., & Asongu, S. A., (2017). "Information Sharing and Financial Sector Development in Africa". *Journal of African Business,* 18(7), pp. 24-49.

Tchamyou, V. S., Erreygers, G., & Cassimon, D., (2019a). "Inequality, ICT and Financial Access in Africa". *Technological Forecasting and Social Change,* 139(February), pp. 169-184.

Tchamyou, V. S., Asongu, S. A., & Odhiambo, N. M., (2019b). "The role of ICT in modulating the effect of education and lifelong learning on income inequality and economic growth in Africa". *African Development Review,* 31(3), pp. 261-274.

Tella, R. D., & Ades, A., (1999). "Rents, Competition, and Corruption". *American Economic Review*, 89(4), pp. 982–993.

Torvik, R. (2009). "Why do some resource-abundant countries succeed while others do not?". *Oxford Review of Economic Policy*, 25(2), pp. 241-256.

Tobin, J., (1958). "Estimation of relationships for limited dependent variables".*Econometrica* 26(1), pp. 24-36.

Tsui, K. K., (2011). "More Oil, Less Democracy: Evidence from Worldwide Crude Oil Discoveries", *The Economic Journal*, 121(551), pp. 89-115.

Uysal, Ö., & Mohamoud, A. S., (2019). "Determinants of Export Performance in East Africa Countries", *Chinese Business Review*, 17(4), pp. 168-178.

Wantchekon, L., (2002)."Why do resource dependent countries have authoritarian governments?"*Journal of African Finance and Economic Development*, 5(2), pp. 57–77.

Yeeles, A. & Akporiaye, A., (2016). "Risk and resilience in the Nigerian oil sector: The economic effects of pipeline sabotage and theft", *Energy Policy*, 88(January), pp 187–196.