



Impact of Natural Resource on Instability in Africa: A Bias-Corrected Least Squares Dummy Variable Approach

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Abstract


This paper examines the influence of natural resources on instability over the 2011–2022 period in 50 African countries using the bias-corrected dummy variable (LSDVC) estimator. The analyses were initiated using the Blundell and Bond estimator. The empirical findings show that natural resources have a significant positive relationship with instability in Africa. This result was consistent when natural resources was decomposed into different indicators. Specifically, results shows that oil rent and coal have positive and significant impact on instability. Furthermore, the results further show that institutional quality will significantly reduce the detrimental effect of natural resources on instability. However, this finding is not significant oil rent. The results indicate that sustaining a conflict-free economy necessitates low unemployment and reduced population growth rates to mitigate the risk of conflict. Consequently, governments seeking to mitigate instability should focus on eradicating or diminishing unemployment and regulating the population growth rate. Policymakers must emphasise equitable resource utilisation and revenue distribution, since these strategies can substantially mitigate instability.

Keywords:

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Oil rent
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1. Introduction

The escalation of violence and civil unrest worldwide is intensifying and is perceived as a global danger to economic advancement and human existence. The detrimental effects of conflict on the economy and human existence, along with its extensive association with resource endowment, have been a significant issue. The phenomenon known as the "natural resource curse" elucidates the contemporary debate and policies about natural resources.

The natural resource curse posits that the wealth of natural resources in underdeveloped countries leads to adverse economic consequences, including various types of conflict, diminished economic development, corruption, and poor governance (Tandi & Mishra, 2020).

Consequently, resources in several poor countries are perceived as a curse rather than a blessing (Tandi & Mishra, 2020; Brunnschweiler, 2008; Sachs & Warner, 2001).

Adhvaryu, Fenske, Khanna, and Nyshadham (2021) shown that states next to resource-rich countries experience significant conflict. In summary, resources have instigated strife and hindered development in both resource-rich nations and adjacent African countries. Conrad et al. (2019) assert that resource theft, extortion, and smuggling enhance rebel groups' capabilities to engage in war and prolong the cycle of conflict in resource-abundant countries. Nevertheless, research has yielded inconclusive results concerning this association. Buonanno et al. (2015) indicated that an abundance of natural resources serves as both a boon and a bane in their research. Vesco et al. (2020) demonstrate that both an abundance and a deficiency of natural resources correlate with an increased probability of violent conflict.

Natural resource conflict dynamics significantly impact contemporary writing on regional studies and international relations concerning the economy (Bayramov, 2018). Conflicts arising from natural resources result in approximately 1,000 battle-related fatalities each year (Bruch et al., 2019) and generate many conflicts from various perspectives (Beevers, 2019; Bruch et al., 2019; Scholvin, 2016). Research indicates that countries rich in natural resources generally undergo economic development, as these resources are crucial for enduring peace and progress. Recent studies indicate that resource-abundant nations frequently encounter conflict and experience slower economic growth in comparison to those with few natural resources (see Fearon & Laitin, 2005; Sachs & Warner, 2001). These resources currently serve a distinct function in Africa and other emerging nations compared to their role in industrialised countries such as Canada and the United States at the start of the 20th century.

In the 21st century, research indicates that resource-rich nations, particularly in Sub-Saharan Africa, the Middle East, and Latin America, have experienced war and sluggish economic growth relative to those with limited or no resources. This situation is termed a resource curse (Auty, 1993). The curse has

prompted several economists and scholars to examine this claim across various nations. The renowned first elucidation of the resource curse theory encompasses structuralist, rent-seeking studies, and the Dutch disease argument (Torvik, 2009; Baland & Francois, 2000; Tornell & Lane, 1999). This resulted in the emergence of several publications contesting the notion that resource richness is a burden for emerging nations.

The contribution of this paper to conflict, instability, and natural resources literature is in two dimensions. First, the main objective of the study is to examine the natural resource curse hypothesis in Africa using an asymptotically efficient dynamic estimator (i.e., the least squares dummy variable corrected). Secondly, this study used data from 50 African countries. Generally, countries with missing or incomplete data for the period of study were excluded from the study only countries, as well as dependent and micro countries. Thirdly, the study further examined the role of institutional quality in the relationship between instability and natural resource endowment. To the best of our knowledge, there are no comprehensive studies that have considered the role of institutions in the resource-instability relationship. Moreover, the link between natural resources and conflict exhibits several complications in methodology, rendering the examination of this relationship by simple econometric techniques such as logistic regression and ordinary least squares (OLS) highly cumbersome. For instance, conflict may react to the finding of natural resources differently in employed populations compared to those with high unemployment rates. The impact of natural resources on conflict might differ based on the country and the specific resource involved. This research addresses heterogeneity by eliminating outliers and categorising the data by natural resources to get more robust results.

The remaining section of the paper is structured as follows: The second section discusses relevant literature pertaining to natural resources and instability and conflicts. Section outlined and discussed the

methodology of the study, which includes the specification of the econometric model, data, and justification of the estimation method. Section four presents and discusses the study's results, while Section five provides the conclusions and recommendations.

2. Literature review

Resources incite conflict via certain processes. These processes can either extend or reduce conflict based on their frequency and impact, as demonstrated by case studies. Greed, grievance, and plunder are three factors that might incite conflict over natural resources. Countries that predominantly depend on natural resources and agricultural goods as their major export commodities are particularly susceptible to conflicts (Collier & Hoeffler, 2004). In addition to the socio-environmental variables that precipitate resource disputes, there exists a social and political structural mechanism. Researchers seek to comprehend the correlation between resources and war, contending that grievances or greed, with factors such as marginalisation, ethnicity, and secessionist passion, elucidate the mechanism through which natural resources incite violence. The looting process suggests that resource endowment may extend the conflict by providing rebels with financial resources to enhance their military efforts, rather than leading to their defeat or necessitating a compromise. Current wars in resource-abundant African nations, including Angola, Congo, Democratic Republic of Congo, Liberia, Nigeria, and Sierra Leone, exemplify this plundering phenomenon. Domestic insurgent factions partake in quasi-criminal endeavours to get supplies. Consequently, natural resources enhance the value of subjugating and asserting dominance over the nation (Fearon & Laitin, 2003). The concentration of riches in a certain region of a nation may incite unrest among groups facing injustice, perhaps prompting some to seek secession (Ross, 2001).

Existing theories suggest that economic and political instabilities are susceptible to natural resource endowment. Models of

conflict indicate that increased natural resource rents lead to more instability and conflict. Moreover, several theories, such as grievance theory, Dutch disease, structuralist theory, and rent-seeking theory, originate from the concept of "greed prospect," which in turn exacerbates complaints. Intensive resource exploitation devastates local communities without offering commensurate recompense. Furthermore, social groups contend that the inequitable allocation of natural resources incites complaints, secessionist agitation, and war, especially when demands remain unmet (Mehlum et al., 2006; Garfinkel & Skaperdas, 2000). Nevertheless, the Neo-Malthusians asserted that resource shortage indicates an increased propensity for violence. Fearon (1995) contends that unsuccessful negotiation can result in conflict due to many factors, including asymmetric information, agency dilemmas, and discord. Consequently, this study adopts the natural resource curse theory. However, conflict theories offer substantial empirical insight for addressing political and economic instability.

The natural resource hypothesis originated in the late 1980s to mitigate economic conflicts in resource-abundant nations (Andersen & Ross, 2014). The natural resources curse posits that countries rich in natural resources face heightened instability, whereas those with less or no resources see minimal conflict. Countries endowed with natural resources and affluence are susceptible to war. Prior investigations, including those by Adhvaryu et al. (2018), Bellows and Miguel (2009), and Ross (2006), have thoroughly examined this claim. Moreover, prior research contends that, in emerging nations, violence escalates in the presence of abundant natural resources and affluence. As a result, developed countries like Norway derive more advantages from natural resources and have a conflict-free environment with elevated economic progress. Notwithstanding their abundant resources, the majority of emerging nations, particularly in Africa, exhibit subpar performance outcomes and significant instability (Ploeg, 2011; Fearon, 2005).

Earlier studies such as Sachs and Warner (1995) conducted a study on the natural resource hypothesis and concluded that the natural resource curse hypothesis is applicable in nations with abundant resources. Moreover, Andersen & Ross (2014) indicated that oil in industrialised countries undermines the economy and diminishes institutional and democratic capacities, rendering communities vulnerable to conflict. Thies (2010) analysed natural resource curse theory using a simultaneous equation framework utilising a worldwide sample from 1960 to 1999. The findings indicate that the existence of oil precipitates civil strife. On the contrary, Gizelis and Wooden (2010) suggest that the effect of oil endowment has no significant impact on conflict, using the same method. Theisen (2012) examines the dynamic association between conflict utilising fixed-effect and rare events logistic regression. The findings indicate that land shortage does not influence conflict.

Several studies have contested and deliberated the correlation between natural resources and conflict. Numerous scholars (e.g., Adhvaryu et al., 2021; Hartwell et al., 2021; Bhattacharyya & Hodler, 2010; Fum & Hodler, 2010) provided substantial evidence that resource endowment is associated with various adverse consequences on economic growth. This argument is, however, inconclusive. Secondly, social and political considerations motivate certain resource-abundant nations to use their resources for developmental progress, while dissuading other resource-rich nations from pursuing similar paths. Third, private enterprises utilise scientific knowledge on natural resources to address underdevelopment. Comprehending the correlation between natural resources and conflict is essential for its resolution and eradication. It functions as a benchmark for advocating and facilitating institutions' exemplary practices concerning resource disputes and peacebuilding (UNEP, 2021).

Østby, Nordas, and Rod (2009) examined the conflict-resource relations for 22 sub-Saharan African countries for the period 1986–

2004, using logistic regression. Their findings indicate that the combination of natural resources and relative family poverty exacerbates conflict. Similarly, Lujala (2010) employed logistic regression to demonstrate that oil production exacerbates conflict, especially when situated onshore, and that the duration of war is twice when resources are located inside the conflict zone itself. Likewise, Fjelde (2009) utilized uncommon event logistic regression. The research indicated that oil production exacerbates violence, whereas corruption intensifies the detrimental impact of oil on conflict.

Denly et al. (2019) examines the correlation between natural resources and war in India and Africa in cross-continental research. A substantial and positive correlation was identified between resources and conflict. Faha (2021) has examined the turning point influence of natural resources on conflict, employing the panel smooth transition estimate method. The research demonstrated a non-linear, substantial influence of natural resources on violence across 124 nations from 1984 to 2017. Similarly, Sini et al. (2021) studied the nonlinear relationship between natural resources and conflict in Africa, using the quadratic form of GMM. The findings suggest the existence of a nonlinear link between conflict and natural resources.

Empirical study findings have revealed the significant influence of natural resource endowment on conflict (O'Brochta, 2019; Ross, 2015; Theisen, 2012; Sorens, 2011; Lujala, 2009, 2010; Basedau & Lay, 2009; Bellows & Miguel, 2009; Brunnschweiler & Bulte, 2009). Africa is becoming a global centre for natural resource discoveries. These resources have significantly exacerbated violence in Africa (Alao, 2007). More recent empirical research, such as those by Faha (2021) and Sini et al. (2021), illustrate that various natural resources affect conflict in varied ways, regarding both the inflection point and the trajectory of the connection. Faha (2021) demonstrated a non-linear, substantial influence of natural resources on conflict across 124 nations from 1984 to 2017,

employing the panel smooth transition estimate method.

Two perspectives have extensively examined the correlation between natural resources and conflict in the literature. The initial perspective examines the relationship between natural resources and conflict, focussing on the validation of the natural resource curse argument. Another perspective examines the relationships between conflict and other economic variables, asserting that increased levels of poverty, unemployment, and population density contribute to heightened conflict (Vadlamannati, 2011). The literature offers empirical data that supports these perspectives on the hypothesis. However, the main issue with previous studies is that they often exclude other important variables that could impact instability (O'Brochta, 2019; Schilling et al., 2018; Ross, 2015). For example, most studies have overlooked the impact of institutions in this relationship, despite the widespread acceptance of the quality of institutions as a major determinant and moderator of several economic variables.

From the foregoing reviewed studies, only very few tested the validity of natural resource curse theory while considering the role of institutions. As the impact of natural resources on instability can be influenced by the governance, the inclusion of the role of institutions is instrumental in determining the impact of natural resources on instability. In addition, this study used a dynamic panel estimation method with the bias-corrected least squares dummy variable (LSDVC) on data from 50 African countries from 2011 to 2022, which is different from most studies that look at the validity of resource curses using logistic regression and ordinary least squares (OLS). The LSDVC employs a bootstrapping approach, which yields more accurate parameter estimates than typical dynamic panel models. This helps to obtain more accurate estimates in any finite sample both in terms of the number of cross and the period.

3. Methodology

3.1. Model specification

In order to investigate the link between natural resources and instability, models (see Appendix 1) from Sini et al. (2021) and Harari and Ferrara (2018) were adopted and modified as shown in Equation (1).

$$\text{Instability}_{it-1} = \beta_0 + \beta_1 \text{NTR}_{it} + \beta_2 \text{HC}_{it} + \beta_3 X_{it} + \gamma_i + \mu_t + \varepsilon_{i,t} \quad 1$$

Where NTR represents natural resource rent, HC denotes human capital, and X represents the control variables the symbols γ_i and μ_t are country specific and time effects, while ε is the error term.

To examine the role of institutions in the link between natural resources and instability, this study introduces an interaction term between natural resources and institutional quality. The transformed model is specified in Equation (2).

$$\begin{aligned} \text{Instability}_{it-1} = & \beta_0 + \beta_1 \text{Instability}_{it-1} \\ & + \beta_2 \text{NTR}_{it} + \beta_3 \text{INST}_{it} \\ & + \beta_4 \text{INSTTTR}_{it} + \beta_5 \text{HC}_{it} \\ & + \beta_6 \text{UM}_{it} + \beta_7 \text{POP}_{it} + \beta_8 \text{POV}_{it} \\ & + \gamma_i + \mu_t + \varepsilon_{i,t} \end{aligned} \quad 2$$

where $\text{Instability}_{it-1}$ is the lagged dependent variable of Instability, INST denotes institutional quality, INSTTTR represents the interaction between institutional quality and natural resources, POP denotes population growth rate, POV represents poverty, UM indicates unemployment, while other variables are as defined in Equation (1).

The analyses begin with the estimation of a baseline model, which involves the estimation of Equation 2 with the interaction term. This is done to obtain the direct relationship between the variables. Secondly, the second estimation is implemented to capture the role of institutional quality by way of interacting natural resource rent and institutional quality.

3.2. The data

This study evaluates the natural resource curse in 50 African nations from 2011 to 2022 using a panel data estimator. In order to mitigate the problem of outliers and heteroskedasticity arising from disparities in their natural resource endowment, dependant and micro countries such as Cape Verde, Comoros, Mauritius, Sao Tome and Principe, Seychelles, and The Gambia, were eliminated from the sample. The selection period for the data was determined by several variables, including data availability, methodology employed, and estimating techniques utilised. Moreover, the selected timeframe witnessed significant unrest and conflicts throughout Africa, attributable to the period of resource control disputes and the rise of insurgent factions, this is in line with Weinstein (2005).

Table 1 presents descriptive data, whereas Table 2 exhibits the correlation matrix (see Appendix 2). The descriptive statistics indicate that the series exhibits a normal distribution. The correlation matrix indicates an absence of substantial association among the explanatory factors. The model is devoid of multicollinearity. According to the research conducted by Perlo-Freeman and Brauner (2012) and Rustad and Ingrid (2019), the metrics employed to assess instability pertain to political instability. In contrast, this study quantified natural resources by categorising the entire natural resources into their various classifications. This study concentrated exclusively on oil and coal, as these are the principal natural resources in Africa linked to instability. The decomposition of countries was primarily performed to assure robustness tests and to achieve more complete findings. This methodology enhances the current body of literature. Tertiary enrolment acts as an indicator of human capital. Human capital has been widely included as a determinant of conflict and instability (Sini et al., 202). Poverty is assessed by household consumption spending. The additional control variables, unemployment and population, were measured by utilising the total unemployed labour and

the population growth rate, respectively, following (Sini et al., 2022; Vadlamannati, 2011; Brunnschweiler & Bulte, 2009). The data on institutional quality is obtained from a composite index of five out of the six measures identified by the Worldwide Governance Indicators (WGI): control of corruption, government effectiveness, rule of law, voice and accountability, and regulatory quality. The World Bank Database and WGI offer comprehensive data on the variables.

3.3. Estimation method

The estimation of dynamic panel data models requires the incorporation of a lagged dependent variable as an explanatory variable, especially in dynamic panel models with limited time series observations, which frequently provide suboptimal asymptotic estimates (Nankervis and Savin, 1987). The incorporation of the lagged dependent variable in a model renders it susceptible to endogeneity issues. The proposed solution to this issue is to utilise the generalised method of moments (GMM) and the instrumental variable (IV) estimators developed by Anderson and Hsiao. Nickell (1981) contends that the asymptotic estimates of the GMM are biased because of finite-series data, and that augmenting the amount of time series observations leads to instrumental variable proliferation (Meschi & Vivarelli, 2009). In this context, bias estimates will be generated using traditional least squares dummy variable (LSDV) or within-group estimators such as fixed effects, GMM, and Anderson and Hsiao instrumental variables (IV).

Nickell (1981) contends that for models with additional explanatory variables, the nature of the bias will be determined by the relationship between the dependent variable and the exogenous variable, such that a positive relationship between the dependent variable and the explanatory variable, will increase the bias, and vice versa. Given these constraints, bias-corrected LSDV (LSDVC) is suggested. The LSDVC procedure was proposed by Kiviet (1995), and the model assumes a stationary first-order (AR (1)) dynamic panel model.

Interestingly, the advantage of the LSDVC over alternative dynamic estimators was verified by the Monte Carlo simulations. The simulations revealed that the LSDVC has a lower variance than alternative mean squared error estimators (Dang et al., 2015). The LSDVC employs a bootstrapping approach, which yields more accurate parameter estimates than typical dynamic panel models. This helps to obtain more accurate estimates in any finite sample (in terms of N, T, or both). However, since the consistency of the LSDVC is dependent on unknown population parameters, the estimation operation must be initiated by an efficient dynamic panel estimator. As a result, the bias correction model is initialised using the Anderson and Hsaio, Arellano and Bond, and Blundell and Bond estimators, which are however equally efficient. In the case of this study, the LSDVC

was initialised using the Blundell and Bond estimator.

4. Results and discussion

To evaluate the validity of the resource curse theory, this study employed the LSDVC technique to analyse the correlation between natural resources and instability in Africa. Additionally, the study used an interaction term (the interplay between natural resource endowment and institutional quality). This methodology elucidates the influence of political institutions on the interrelationship of the variables. The analysis utilised total natural resources as a key independent variable. Moreover, the study disaggregated total natural resources into several components for robustness verification. Thus, the study utilises oil rent and coal rent to substantiate the overall findings. This section presents the findings from Blundell and Bond, given that all LSDVC estimators exhibit similar efficiency.

Table 1: Summary results on the relationship between instability and natural resource endowment

Variable	Model 1	Model 2	Model 3
Instability _{it-1}	0.603*** (0.10)	0.519*** (0.13)	0.382*** (0.09)
Total resource rent	0.312*** (0.08)		
Oil rent		0.192** (0.09)	
Coal rent			0.069** (0.03)
Human capital	0.132 (0.09)	0.211 (0.16)	0.119 (0.13)
Unemployment	0.228** (0.12)	0.318** (0.15)	0.302** (0.14)
Population growth	0.862*** (0.16)	0.991*** (0.18)	0.739*** (0.06)
Poverty	0.098*** (0.02)	0.102** (0.05)	0.131*** (0.03)
Constant	1.252*** (0.32)	1.752*** (0.18)	0.907*** (0.27)

Note: ** and *** represent significant at 5% and 1% levels, respectively; values in parenthesis are standard errors.

Table 1 (Models 1, 2, and 3) presents the estimated outcomes of the natural resource curse. The findings from Table 1 indicate that overall natural resource rent, oil rent, and coal

rent are substantial and positive. This outcome indicates that the factors substantially contribute to instability in Africa and corroborates the presence of the natural

resource curse theory in the region. Furthermore, the findings indicate that population growth, unemployment, and poverty are critical factors influencing instability. The strain on resources resulting from population increase, unemployment, and poverty significantly exacerbates instability. Conversely, human capital seems to be inconsequential. This indicates that human capital is not a major factor in instability.

Models 1, 2, and 3 illustrate the elasticity of natural resources, demonstrating that variations in their availability are less impactful than fluctuations in instability in Africa. Model 1 indicates that the proportionate variation in oil rent exceeds the variation in instability. A 1% increase in natural resources leads to about a 31.2% rise in total resource rent, 19.2% in oil rent, and 6.9% in coal rent, indicating heightened instability in Africa for models 1, 2, and 3, respectively. The results indicate that natural resources are significantly and positively correlated with instability, aligning with the natural resource curse hypothesis and providing empirical validation for Adhvaryu et al. (2021), Tandi and Mishra (2020), and Vesco et al. (2020). These results suggest that African nations have encountered heightened conflict and instability correlated with an increase in natural resource endowment.

Several studies align with these findings, suggesting that mineral resources like coal and crude oil endowment, despite their significant revenue generation from resource extraction, generate low economic returns in developing countries. For instance, Di John (2010) argues that the abundance of these resources often leads to corruption, slower economic development, instability, and conflicts, particularly in developing countries. Therefore, it is often referred to as a resource curse (see Tandi & Mishra, 2020). Several other studies however suggest that political and socio-economic issues, including cultural divisions, demographic composition, technological advancements, revenue-sharing mechanisms, over-dependence in resources, environmental degradation and institutional quality, are also

important determinants of these resource-induced conflicts (O'Brochta, 2019; Schilling et al., 2018).

Furthermore, one of the distinguishing characteristics of a dynamic panel estimator is that it necessitates the inclusion of the lagged dependent variable. Therefore, the analysed coefficients for the variables, including the lagged dependent variable ($Instability_{it-1}$), are positive and significant. This suggests that the previous year's level of instability influences the current level of instability.

Table 2 illustrates the impact of institutional quality on the natural resource theory. This section focuses on the interaction between institutional quality and natural resource rent. The findings show that the interaction between natural resource rent and institutional quality is negative and significant at the 5% level (Model 4). When we break down the interaction into oil rent and coal, we find that oil rent is both negative and insignificant, while coal is both negative and significant at the 1% level (Model 6). Specifically, the results indicate that a 1% increase in natural resource rent will result in a 13% decrease in instability, provided that there is a high level of effective institutions in place. However, while considering the individual factors of natural resources, the results show that institutional quality would not significantly reduce the impact of oil rent on instability in Africa (see model 5).

Similar to the results in Table 1, the findings in Table 2 demonstrate the crucial role of the lagged dependent variable ($instability_{it-1}$) in determining the level of instability in Africa. This suggests that the previous period's level of instability significantly influences the current period's level of instability. These findings are consistent across the three models in Table 2. Furthermore, the analysis of the control variables suggests that population growth, unemployment, and poverty significantly contribute to the level of instability in Africa. Interestingly, population growth appears to contribute more to instability, with a change in population growth leading to more than a proportionate change in instability.

Table 2: Summary results on the impact of institutions in the instability and resource relationship

Variable	Model 4	Model 5	Model 6
Instability _{it-1}	0.483*** (0.11)	0.315*** (0.07)	0.572*** (0.14)
Total resource rent	0.411*** (0.103)		
Oil rent		0.108** (0.05)	
Coal rent			0.022 (0.07)
Institutions	0.003 (0.06)	-0.071** (0.03)	-0.263 (0.17)
INSTTRR	-0.013** (0.0061)		
INSTOil		-0.094 (0.13)	
INSTCoal			-0.013** (0.0061)
Human capital	0.191 (0.14)	0.103 (0.09)	0.111 (0.09)
Unemployment	0.291** (0.13)	0.221** (0.11)	0.187** (0.08)
Population growth	1.312*** (0.24)	1.281*** (0.19)	1.068*** (0.31)
Poverty	0.253** (0.11)	0.232** (0.10)	0.192*** (0.05)
Constant	2.082*** (0.38)	2.140*** (0.46)	1.83*** (0.31)

Note: INSTTRR = the interaction between institutions and total resource rent; INSTOil = the interaction between institutions and oil rent; INSTCoal = the interaction between institutions and coal rent; ** and *** represent significant at 5% and 1% levels, respectively; values in parenthesis are standard errors.

Several other studies however suggest that instability is susceptible to various factors including but not limited to, power imbalance, resource scarcity, especially when there is corrupt and weak governance. Generally, weak governance can exacerbate conflicts over resources, as individuals and groups seek to exploit resources for personal gain. Specifically, asymmetric distribution of resources can create power imbalances, fuelling conflicts between those who have access to resources and those who do not. On the other hand, resource curse theorists posit that abundant resources can lead to corruption, rent-seeking behaviour, and poor governance,

causing political instability (Schilling et al., 2018; Ross, 2015).

5. Conclusion and policy recommendations

This research assessed the validity of the natural resource curse theory in Africa using the bias-corrected least squares dummy variable method. This paper's findings contest the prevailing conventional literature on the natural resource curse hypothesis, which predominantly employs ordinary least squares and logistic regression methods, neglecting a more efficient and reliable approach, particularly regarding endogeneity concerns. Furthermore, this study examined natural resources with institutional quality to assess the

impact of institutions on the relationship between the variables.

The primary findings demonstrate the presence of the natural resources curse hypothesis in Africa, as indicated by a significant positive association between natural resources and instability. The study's findings suggest that it would be unwise for African decision-makers to overlook the natural resource curse as a theoretical framework for tackling instability. The continent's heightened violence, significant population growth, unemployment rate, and abundant natural resources increase the possibility of enduring economic disasters unless institutions are fortified to implement measures that alleviate potential economic threats. Therefore, governments must devise methods to alleviate this risk instead of relying solely on increasing natural resource output and addressing disputes and instabilities thereafter.

Implementing more progressive diversification strategies is crucial to diminish nations' reliance on natural resources. Moreover, it is essential to focus on how resource-scarce nations allocate their generated revenue. African leaders should promote enhanced public comprehension about the source, timing, and allocation of money. Civil society organisations should be permitted to oversee the allocation of these funds. The oil revenue management legislation governs and dictates the distribution of oil revenues. Additionally, we must devise and implement legislative methods to equally allocate money from natural resource exploitation, promote growth in resource-abundant regions, and offer scholarships to students from these revenue-generating areas to guarantee economic success.

Moreover, the government must deliver adequate public education and institute explicit land tenure regulations to regulate population movement to resource extraction regions. Policymakers should engage in advocacy and research to protect citizen rights and privileges, preserve the environment, and promote humanitarian efforts and peace initiatives to combat insurgent activities, provide timely

warnings and insights, and improve societal capacity for conflict mitigation and management. Ultimately, authorities must enhance societal engagement in firms' extraction of natural resources. Companies involved in resource extraction ought to provide incentives and additional assistance to the government and communities affected by their operations.

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Appendix 1

The model from Sini et al. (2021):

$$CONFLT_{i,t} = \gamma_0 + \delta_1 NATLR_{i,t} + \delta_2 HUCAP_{i,t} + \delta_3 X_{i,t} + \gamma_i + \mu_t + \varepsilon_{i,t}$$

CONFLT represents conflicts, *NATLR* refers to natural resources, *HUCAP* is human capital, *X* denotes the vector of control variables which are unemployment, population density, and poverty, γ & μ are the country and year fixed effects.

The model from Harari and Ferrara (2018):

$$ANY\ EVENT_{c,i,t} = \alpha_0 = \sum_{k=0}^2 \beta_1 C_{c,t-k} + \sum_{k=0}^2 \beta_2 GS_C_{c,t,k} + \delta X_c + \gamma_i + \mu_t \tau + \varepsilon_{c,i,t}$$

The study considered a panel of N cells and T years, denote with C a generic climate indicator and with GS C the climate indicator measured in the cell-specific growing season. X represents a vector of time-invariant controls and γ and μ denote year and country fixed effects, respectively. where c denotes the cell, i the country, and t the year, and τ is a linear time trend.

Appendix 2

Table 3: Summary statistics for 50 African countries

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
High-Income Developing Countries					
Instability	600	-1.83	0.94	-2.19	0.73
Natural resource rent	600	0.23	1.14	0.00	5.89
Institutional quality	600	-1.31	18.52	-1.92	0.81
Human Capital	600	56.90	11.19	39.72	84.63
Unemployment	600	15.57	38.87	3.76	48.87
Population growth	600	2.35	86.14	0.98	2.41

Table 4: Correlation Matrix

Variables	Instability	Natural resource rent	Institutional quality	Human Capital	Unemployment	Population growth
Instability	1					
Natural resource rent	0.82	1				
Institutional quality	-0.31		1			
Human Capital	-0.01	-0.21		1		
Unemployment	0.13	-0.09	0.10	0.10	1	
Population growth	0.03	-0.21	0.04	0.32	0.08	1