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## Article

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# Untangling Africa's peace and growth trajectories: the role of property rights

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## ABSTRACT

The role of government in promoting property rights has been acknowledged in the literature. This study investigates the impact of property rights peace, and consequently the impact of peace and property rights on economic growth, utilizing the system Generalized Method of Moments technique on panel data on 31 African countries from 2008 to 2019. The results indicate that the institutional structure in natural resource-based countries, through mitigating the effects of the natural resource curse phenomenon, improves economic growth. The paper concludes with actionable recommendations on the contributions of property rights on peace and economic growth and recommends policies that improve the quality of property rights in the African context and government integrity. The role of government is critical in Africa, in ensuring improved property rights and ensuring a peaceful environment for growth.

## 1. Introduction

Property rights are critical to peace and economic growth. The extant literature links institutional quality (encompassing several indicators including the quality of property rights) to peace. Well-functioning institutions are conceived as a mechanism for addressing commitment problems which are capable of igniting armed conflicts (Walter, 2014). Moreover, the space for rebellion can be reduced when the quality of institutions is high (Fearon & Laitin, 2003), while good institutions reduce grievances that can lead to conflicts (Hegre & Nygard, 2014). There are two main channels through which institutions promote peace or address conflicts: by providing structures that can either facilitate or curtail conflict; and shaping the motivations that bring about violence (Wig & Tollefsen, 2016)..

Property rights are vital to peace and peace-building and this is relevant in the African context. For instance, customary institutions have used effective communication and rules of interaction to address conflicts over land and cattle (Ocan, 1994). Additionally, Frank and Paz-Castillo (1999) have reported that in order to have access over common grazing resources, armed and violent conflicts have often taken a centre stage in group interaction. This is particularly so in Africa where

land issues are pervasive and where the right to land can be linked to positive peace, understood as a necessary condition for establishing and consolidating lasting peace (FAO, 2005).

While property rights matter for peace, they also matter for economic growth, as the role of peace or lack of it (in the sense of conflicts) to economic prosperity is acknowledged in the literature. Secure property rights influence the allocation of resources and economic activity through four main channels (Besley & Ghatak, 2009). These are: (i) facilitation of transactions, where property rights support other transactions that promote resource acquisition in the financial market; (ii) security channel, where the income flowing from investment needs protection against expropriation in order to incentivize investment; (iii) efficiency channel, which enhances transfer of assets to where they are most productive; and (iv) reduction of protection cost, which enables economic agents to protect their property at lower cost.

This study is on Africa, where in the last decade, achieving sustained growth seems to have defied orthodox predictions, prompting the need to look beyond pure theoretical economic underpinnings of growth. Consequently, there has been a renewed focus on socio-political factors, with peace being a cardinal spectrum. Peace is perceived as a socio-political environment with the absence of violence and ethnic crisis,

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encapsulated in societal safety, lack of militarisation, and on-going internal and external conflicts (Institute for Economics and Peace [IEP consequently], 2024). Thus, the imperative of peace to the prosperity trajectory is gaining renewed momentum among development actors (Yapatake & Shan, 2018). The channels through which conflict (or lack of peace) impacts economic growth and consequently on economic performance are documented in Collier (1999).

Since the end of World War II in 1945, the rate of armed conflict has been on a declining trend in most regions (Pinker & Mark, 2014). However, in Africa, efforts at achieving same ends continue to be disappointing. For instance, in 2013, out of 33 non-state conflicts experienced globally, Africa accounted for one-third of the total, resulting in loss of both human and physical resources and declining economic growth. In the late 1980s, there were series of peacekeeping efforts towards peace-building by both regional economic groups and international organisations, leading to a decline in the rate of interstate conflicts. Within a decade (2007-2017), out of 179 conflicts experienced in the region, about 115 were intrastate, representing 64.3% of the total conflicts experienced (Uppsala Conflict Data Programme, 2018). The increasing rate of intrastate conflict explains the poor position occupied by African countries in the ranking of peaceful nations (IEP, 2019). In 2018, among the five least peaceful countries, South Sudan and the Central African Republic ranked 161 and 162 respectively out of 163 countries in the list (IEP, 2018). In 2019, the Democratic Republic of Congo topped the list in Africa, followed by Nigeria, ranking 155 and 148 out of 163 countries respectively. The intrastate nature of these conflicts implies that the absence of peace in Africa cannot be explained by external aggression, but by institutional factors including perceived marginalisation by sections of the society, unequal access to public resources, weak law enforcement mechanisms, among others. Thus, the link between institutions and peace on the one hand, and between institutions and economic growth on the other cannot be overemphasised in the African context.

The deteriorating level of peace in Africa has threatened the achievement of the Sustainable Development Goals (SDG) 16 which deals with *Peace, Justice and Strong Institutions*. An x-ray of the human capital cost of the absence of peace shows that battle-related death as a result of the conflicts in 2005 was about 1,554 persons, rising to 11,996 in 2014, while in 2017, the figure experienced a marginal decline and stood at 10,298 persons. The economic impact of violence in Sub-Saharan Africa was estimated at €616 billion in 2017, representing an increase in the cost of conflicts by 21 percent just within a decade (IEP, 2019).

This study contributes to the extant literature in several ways. First, existing literature has arguably failed either to consider the influence of property rights as a determinant of peace or the nexus between peace, property rights, and economic growth in Africa. This study investigates the influence of property rights on peace and the channels through which this impacts growth, using the System Generalised Methods of Moments (hereafter system GMM) on a panel of 31 countries in Africa. This differs from previous studies on methodological grounds. For instance, Braithwaite et al. (2014) adopted a panel of cross-section that is prone to small sample size, and which does not provide enough degrees of freedom for valid statistical inference. Additionally, adopting a panel fixed-effect to estimate a dynamic growth model, as is the case of Polachek and Sevastianova (2012) results in the problem of autocorrelation due to the violation of assumptions of exogeneity (Amarante, 2014).

Second, this study provides empirical support for the preposition of ethnic and neoclassical theorists on the important role of property rights when explaining the deteriorating level of peace. This shows that the negative impact of natural resource abundance on peace is of higher magnitude compared to that of poverty. Consequently, evidence is provided indicating that the negative impact of natural resource endowment is underscored by weak property rights in the continent, while accounting for the economic performance. Aside from this

introduction, Section 2 provides a brief review of literature, Section 3 explains the methodology while the results are presented and discussed in Section 4. Section 5 concludes the paper.

## 2. Literature review

### 2.1. Theoretical framework

Our first model examines the impact of property rights on peace. An important theoretical contributions in the field of peace-economic performance nexus is provided by Mousseau (2009), referred to as the “Economic Norms Theory”, which postulates that the existence of a competitive and just economic environment that guarantees equal opportunities could bring about a rise in public benefits and consequently promotes peace within and between countries. This theory thus brings within the free market economy certain conduct and rules of engagement which guarantee that countries are interdependent and where relationships are not a zero-sum game but one that optimizes mutual benefits. In this context, the role of the institutional environment which guarantees protection of property rights is likely to result in peace. Ostrom (2000) considers property right as an enforceable authority to carry out specific action in specific domains. This definition points to the fact that, rather than ownership *per se* as the critical element, what is important is the collection of rights (exchange, benefit, use and selling) as well as institutional qualities of rights (extent of specification, security, exclusion, and transferability) which is given to an individual user of a resource. Consequently, rules and various enforcement mechanisms are needed in a property system, which call for the role of the state in ensuring a system of property rights which obviate conflicts. In a similar vein, Sen (1995) provides a useful discussion of the role of entitlement to resources and argues that ignoring the distribution of the means of resource acquisition makes the consideration of absolute resource distribution largely irrelevant. Where conflicts arise in places endowed with natural resources, evidence points to poorly-defined property rights as being at the heart of the problem (Alston et al., 1999).

The second model is used to investigate the impact of peace on growth and is underpinned on the endogenous growth model, due to Romer (1986), but extended to include peace and property rights. The endogenous growth model emphasizes that long-term economic growth is driven by human capital, knowledge accumulation and technological innovation. Technological activities succeed in a peaceful environment and the spill-over effects of such activities will ensure continuous growth when there are well-defined property rights (Acemoglu et al., 2001). From the endogenous growth theory, it can be seen that the use of information and telecommunications technology and the internet, exemplified by increasing mobile cellular subscription, can improve the economic environment for growth.

Overall, the imperative of property rights as a predictor of peace or growth cannot be overemphasised. Property rights are legal instruments enforced by the government, which assign to individuals equal access to public resources, allow them to acquire and utilize private property, secured by clear laws (Heritage Foundation, 2019). A well-defined property right ensures peace, which could be conceptualised as an anticipated social order achievable through the instrumentality of law and the threat of it (Galtung, 1967). In the context of this study, peace is a state of harmony achieved from the absence of violence (Institute for Economics and Peace, 2018). Peace could be positive or negative. Positive peace entails the absence of conflicts, war, fear, anxiety, suffering, and violence either within or between territories.

In the case of Africa, which primarily produces raw materials for exports and are mostly resource-based, there are several mechanisms through which property rights could reduce resource-based conflicts. First, clearly defined property rights ensure that individuals and communities are less likely to be involved in violent conflicts over resources because clarity is provided on who owns what, thus promoting security of ownership. In this context, sustainable resource management is

incentivized, which promotes dispute resolution. The implication of this is that strong institutional quality can significantly mitigate the resource curse by among others facilitating transparent natural resource management, while minimizing rent-seeking behaviours.

Moreover, land tenure is a major cause of conflicts in Africa and most often, policies that take account of peace and involving land become a vital part of efforts at resolving issues after wars (Colletta et al., 1996; Crocker & Hampson, 1996). Land is so important that ties related to it often take precedence over formal law (Griffiths, 1986). Thus, the institutional dynamics in Africa are such that formal laws (such as property rights systems enshrined in the constitutions) and informal or customary systems interact to shape the nature and intensity of conflicts in the continent.

The two frameworks on which this study is based are complementary, in the sense that positive peace builds and reinforces the institutions and structures of society which allow it to grow. By creating resilience and adaptability, a society will be able to provide mechanisms that assist it to pre-empt conflict and thus promote peace.

### 2.2. Empirical literature

This section reviews the strands of literature linking property rights, peace and growth.

*Property Rights and Peace:* Huang and Throsby (2011) examined the determinants of peace from 2007 to 2008 in a cross-country study consisting of over a hundred countries and reported that countries with good economic performance are likely to be more peaceful, while countries with strong institutions that ensure functioning democracies and government integrity tend to have greater peace. In a study by Oasis (2012), inflation was found to be a positive determinant of peace, while life expectancy (a proxy for poverty) reduces peace, while the result of the relationship between economic growth and peace is mixed. Testing the relationship between institutional variables and peace, political rights or political freedom is significantly detrimental to peace, while civil liberty which allows for freedom of expression is conducive for peace. Paola et al. (2020), adopting a meta-analysis approach on over 900 estimates from 41 articles, concluded that resource constraints and natural endowments significantly increase conflicts, although they stated that the nature and magnitude of the relationship depends on whether the resources are renewable or non-renewable. Examining the impact of poverty on conflict (measured by the peace years), Braithwaite et al. (2014) concluded that poverty rights is an increasing function of conflicts.

*Property Rights and Economic Growth:* Several studies reported that property rights and their allied factors such as contract enforcement and rule of law promote growth (for example, Knack & Keefer, 1995; Johnson et al., 2002; Kerekes & Williamson, 2008; McLennan & Le, 2011; Green & Moser, 2012). Some investigators have however argued against property rights as determinants of growth (see for example, McArthur & Sachs, 2001; Fogel, 2004).

*Peace and Economic Growth:* The impact of peace on economic performance has been extensively investigated, with most of the studies viewing economic performance from the point of view of growth. The results are consistent and indicate that conflicts (i.e. lack of peace) are negatively related to GDP growth. Collier and Hoeffler (2004) concluded that a war within five years in a country may bring down the growth rate by 2% annually. In the same vein, in a study encompassing a group of 14 countries that suffered from wars, it was found that the per capita GNP decreased by about 3.3% (Stewart et al., 2001). Bozzoli et al. (2010) has also shown that mass violent conflict reduces GDP growth between 1 and 3 percentage points.

Santhirasegaram (2008) investigated the impact of peace on the GDP growth rate in 70 developing countries from 2000 to 2004, and reported that peace is more influential to economic growth rates compared to traditional variables including employment, capital formation, technology and free market. Several other empirical studies have arrived at

the same conclusion, that civil wars hurt growth (e.g., Polachek & Sevastianova, 2012; Biswas et al., 2016). Polachek and Sevastianova (2012) used data drawn from correlates of war projects across countries, and concluded that war reduces economic growth by about 0.01–0.13%, while inter-states conflict reduces growth by 0.18–2.77%, although Biswas et al. (2016) ruled out the short-term negative impact of ethnic conflict on growth. Investigating the impact of political instability on growth among ECOWAS member countries, Godwin (2017) concluded that it is the riskiest sub-region in Africa with significant declining impacts of terrorism, social unrest, and weak institutions on economic growth.

### 3. Methodology

#### 3.1. Data and measurements of variables

The study used secondary data covering the period of 2008-2019 on 31 African countries. A list of the countries used is presented in Appendix 1. The sample size was based on the need to have a balanced panel and to avoid dropping an important variable due to the unavailability of data for some of the countries. Consequently, countries without a complete data stream were dropped. The study explored several sources of data as presented in Table 1.

To ensure the dependent variable (peace) has a positive attribute of “peacefulness”, the original Global Peace Index (GPI) score was subtracted from 4, hence the higher the value of the final score, the more peaceful is the country and vice versa (Huang & Throsby, 2011).

The Global Peace Index (GPI) was used as a proxy for peace. It deploys three domains of peacefulness, namely extents of *Ongoing Domestic and International Conflict, Societal Safety and Security* and *Militarisation*, all of which are relevant in the African context.

The study used property rights and government integrity indices from the Heritage Foundation (2019) as proxies of the institutional environment. ICRG institutional indices have been widely used as a proxy of institutional quality (Djankov & Reynol-Querol, 2007; Kaufmann et al., 2009). However, it has been argued that ICRG data do not reflect the risk posed to the property rights of the weak and marginalised ethno-cultural minority group but reflects the risk posed to the big enterprises and multinational institutions (Lawson-Remer, 2012). In light of this, the study considered institutional indices from the Heritage Foundation more appropriate as it measures the quality of land

**Table 1**  
Measurement of variables and data sources.

Variable (Acronym)	Measurement	Source
Peace	Global Peace Index	Institute for Economics and Peace (2019)
Economic Growth (GR)	Real Gross Domestic Product per Capita	World Bank (2020)
Stock of physical Capital (SPC)	Gross fixed capital formation	World Bank (2020)
Human Capital(HC)	Total labour force	World Bank (2020)
Property Rights (PR)	Index of quality of property rights	Heritage Foundation (2019)
Government integrity (GINT)	Government integrity	Heritage Foundation (2019)
Resource Endowments (RE)	Total natural resource rents as a percentage of GDP	World Bank (2020)
Free flow of information (FFI)	Number of the total population with mobile Cellular Subscription	World Bank (2020)
Inflation (INF)	Inflation rate (annual %)	World Bank (2020)
Poverty (POV)	Infant mortality rate	World Bank (2020)
Resource constraint (RC)	Co2 Emission kwt	World Bank (2020)
Social infrastructure: internet (INT)	Individuals using the Internet (% of population)	World Bank (2020)

Source: Authors’ compilations.

administration, which is a major source of violence in resource-rich economies, such as those in Africa.

The use of infant mortality rates as a proxy for poverty has theoretical underpinning. First, infant mortality are strongly correlated with poverty-related factors including health, education and income. It is known for instance that higher incomes are associated with lower infant mortality rates and vice versa. Similarly, lower education and restricted access to healthcare are often a reflection of poverty. Addressing poverty has been found to significantly reduce postneonatal mortality (Komro et al., 2016). In the same way, high infant mortality rates are often associated with the poor (Mohamoud et al., 2019) while programmes such as cash transfer aimed at reducing infant mortality are often targeted at the poor (Akresh et al., 2015).

### 3.2. Model specification

This study considers a panel dynamic model. To achieve the objectives, two models are specified. The first model (equation 1) examines the role of property rights in ensuring peace, while the second model (equation 2) is used to investigate the impact of peace on economic growth. Model 1 is in line with Biswas et al. (2016), while Model 2 follows a standard endogenous growth model augmented to include peace and property rights.

$$Peace_{it} = \alpha_0 + \alpha_1 PR_{it} + \alpha_2 X_{it} + \alpha_3 RE_{it} + \varepsilon_{it} \tag{1}$$

$$GR_{it} = \alpha_0 + \alpha_1 Peace_{it} + \alpha_2 PR_{it} + \alpha_3 HC_{it} + \alpha_4 SPC_{it} + \alpha_5 X_{it} + \varepsilon_{it} \tag{2}$$

where  $Peace_{it}$  denotes the level of peace in country  $i$  during period  $t$ ,  $PR$  denotes property rights,  $RE$  is a symbol of resource endowments,  $HC$  and  $SPC$  denote human capital and stock of physical capital for country  $i$  at time  $t$  respectively.  $X_{it}$  is a vector of factors that impact peace and economic growth such as the flow of information (FFI), economic factors encompassing poverty (POV) and economic development (GDP), resource constraint (RC) and uncertainty (proxied by inflation, INF). EG in model 2 represents economic growth,  $\varepsilon_{it}$  is the error term which is identically and independently distributed, while  $\alpha_1 \dots, \alpha_5$  are parameters to be estimated. Following Arnold et al. (2011), a dynamic panel model is specified in an estimable form for equations 1 and 2 as follows:

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$$\Delta Peace_{it} = \alpha_0 + \lambda \ln Peace_{(t-1)ij} + \alpha_1 \ln PR_{(t)ij} + \alpha_2 \ln FFI_{(t)ij} + \alpha_3 \ln GDP_{(t)ij} + \alpha_4 POV_{(t)ij} + \alpha_5 INF_{(t)ij} + \alpha_6 RE_{(t)ij} + \alpha_7 X_{(t)ij} + \varepsilon_{ij} \tag{3}$$


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$$\Delta \ln GR_{ij} = \alpha_0 + \varphi \ln GR_{(t-1)ij} + \alpha_1 Peace_{(t)ij} + \alpha_2 \ln PR_{(t)ij} + \alpha_3 \ln HC_{(t)ij} + \alpha_4 SPC_{(t)ij} + \alpha_5 \ln RE_{(t)ij} + \alpha_6 RC_{(t)ij} + \alpha_7 FFI + \alpha_8 X_{(t)ij} + \varepsilon_{ij} \tag{4}$$


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where the variables are as earlier defined. From equations 3 and 4,  $Peace_{t-1}$  and  $LNGR_{t-1}$  are previous year's level of peace and economic growth respectively. All the variables were initially transformed into natural logs except INF and RC. To ascertain the indirect effect of property rights (a proxy of institutional quality) on peace and growth through resource curse, the interaction term  $X_{(t)ij}$  is introduced in equations 3 and 4. This is important for estimating the effect of natural resources on economic growth (Amiri et al., 2019) and peace.

### 3.4. Estimation techniques and procedures

Test of correlation was used to determine how property right correlates with peace, and how peace correlates with growth, while panel regression analysis was adopted in testing the nature of the relationship among the series. To avoid possible reverse causality, serial correlation in the dependent variable and estimate a panel with short T and large N, the models were estimated using System GMM. Adopting ordinary panel fixed-effect in estimating a growth model is associated with shortcomings. For instance, according to business cycle models, economic growth is a dynamic characterised with lags of its value among explanatory variables, thus violating the assumptions of exogeneity and the non-stochastic properties due to autocorrelation it generates (Amarante, 2014). These shortcomings are corrected for, using System GMM (Blundell & Windmeijer, 2000).

The assumptions of uncorrelated error terms, valid instruments, and the changes with additional instruments are uncorrelated with country fixed effects make the System GMM estimators to be consistent. Thus, by utilizing GMM, one avoids the preponderance of biased and inconsistent estimates associated with pooled OLS regression. Moreover, because failure to incorporate dynamic component into a model may lead to specification biases, this study considers a dynamic analysis germane. Lagged dependent variable as a regressor is one way to capture the dynamism in a model. Using OLS estimator in this context can elicit problems of endogeneity and the associated bias and inconsistency of estimates. For example, an important factor affecting peace is income, one of the regressors in the current study. However, there is the potential endogeneity of income as the positive relationship between income and peace does not of necessity reflect causation from income to peace, as there might be third factors which show why some countries tend to have more peace than others. It is also plausible to have reverse causality, in which case greater amount of peace can impact income. All of this calls for the deployment of a technique which addresses potential endogeneity. In this study, the dynamic generalized method of moment (GMM) was used, following Arellano and Bover (1995) and Blundell and Bond (1998) approaches. As a robustness check and to evaluate the sensitivity of our results to alternative framework, the first difference GMM was used.

A major issue in panel data is weak instruments, which the system-

GMM can address. It also controls for endogeneity (by including the lagged dependent variable as a regressor), measurement errors and missing or omitted variables. To treat endogenous variables, the usual practice is to use 2 lags and higher lags for the transformed equation, and 1 lag for the levels equation. Because the number of instruments should not be more than the number of groups, the endogenous variables are instrumented with fewer lags. Due to the proliferation of instruments, which has posed a major problem in the empirical research, Roodman (2009) suggested that, the set of instruments could be either restricted to a given number of lags, collapsed or a combination of the two methods. To implement the technique in this study, the set of

instruments was restricted to 2 lags and collapsed.

#### 4. Results and discussion

The descriptive statistics are presented in [Appendix 2](#) and are not discussed to conserve space. However, the descriptive statistics indicate a wide variability in almost all their economic and institutional characteristics except for the level of economic development and resource constraints. The similarity in level of development is expected because African countries are categorised as underdeveloped economies, while in most less developed economies, over exploitation of natural resources is common practice. Furthermore, from the raw GPI figures utilized in the study to derive the dependent variable, there are substantial disparities in ‘peacefulness’ among the countries, with a minimum score of 1.63 and a maximum score of 3.25 on a scale of 1.1 to 3.29. The same applies to the quality of property rights with a minimum score of 5.00 and a maximum score of 69.8 during the period of investigation.

The results of both the Kendall’s tau nonparametric correlation and the ordinary covariance tests indicate the existence of a significant negative correlation (discordance) between property rights, mobile subscription, and peace and a concordance between poverty, growth, and peace. The association between property rights, peace, and growth is significant (see [Appendices 3 and 4](#)).

The results of the test of endogeneity are presented in [Appendix 5](#). In both models, the null hypothesis that the variables are exogenous is rejected, the implication of which is that there is endogeneity. However, the sources of endogeneity were found to be property rights for the peace equation (model 1) and human capita for the growth equation (model 2) respectively.

[Table 2](#) presents the system GMM results of estimated [Eq. 3](#) which examines the impact of property rights on peace.

From [Table 2](#), it is revealed that the impact of property rights on

**Table 2**  
Results of the estimated peace equation.

Dependent variable: peace				
Variables	(1)	(2)	(3)	(4)
PEACE(-1)	0.2265*** (8.3825)	0.3142*** (5.8741)	0.3028 (4.639)	0.2239*** (4.9692)
LNPR	0.080207 (0.7985)	0.0135 (0.1072)	-0.2388* (-1.8654)	0.4249*** (4.0599)
LNPOV	-0.2530* (-1.8410)	-0.2443 (-1.4192)	-0.5461*** (-3.0155)	0.0697 (0.4997)
LNGR	0.0515*** (4.4574)	0.3015*** (5.2829)	0.6271*** (5.3531)	0.0644*** (4.2534)
LNRE	-0.0892*** (-3.7879)	0.3427*** (4.3397)	0.5366*** (4.5443)	-0.1104*** (-4.2547)
LNFFI	-0.1926*** (-2.941193)	-0.1760*** (-2.4201)	-0.1196 (-1.4551)	-0.2866*** (-4.1962)
RC	-0.0653 (1.0823)	-0.0404 (-0.3203)	0.0035 (1.2532)	0.2673 (1.1799)
INF	0.0013 (1.0823)	0.0039* (1.8321)	0.1616*** (4.3468)	-0.0033* (-1.6774)
C			1.8137*** (6.5179)	
PR*RE		-0.1071*** (-4.5905)		
PR*RC			-0.4972*** (-7.1351)	
Diagnostic Statistics				
Instrument rank	31	31	31	31
J-statistic	25.2761	24.846	24.6895	25.7028
J. Stat. Prob.	0.3362	0.3045	0.2609	0.3151
AR2	-0.0174	0.0175	0.0105	-0.0416
AR2 (Prob)	(0.8210)	(0.8344)	(0.9071)	(0.9668)

Note: \*\*\*, \*\* and \* represent 1%, 5% and 10% level of significance respectively. Columns 1–3 were estimated using system-GMM, while column 4 was estimated using Difference GMM. The values in parentheses are the t-statistics. Source: Authors’ computations.

peace is not clear. The coefficients of PR in columns (1) and (2) suggest that PR is favourable to peace, with an insignificant impact while in column (3) the variable exerts a negative significant impact on peace at 10%. Previous studies have also confirmed a positive relationship between the security of property rights and conflicts ([Lawson-Remer, 2012](#)).

Access to information deteriorates peace significantly and this holds across all the regressions. Although the impact is insignificant in column (3), in columns (1) and (2) the deteriorating impacts are significant and robust. This is in contrast to previous empirical findings that access to information ([Oasis, 2012](#)) and press freedom ([Huang & Throsby, 2011](#)) are found to be conducive to peace. Surprisingly in Africa, access to information technology and the use of mobile phones in particular have increased the use of social media as a popular means of information dissemination. This has encouraged hate speech, fake news and rumours which have endangered peaceful coexistence over the years.

The estimated impact of macroeconomic factors (measured by the level of economic development and poverty) on peace indicates infant mortality rate (a proxy for poverty) is significantly inimical to peace as shown in columns (1) and (2), while in column (3), the impact remains insignificant. On average, it could be concluded that poverty is a significant negative function of peace. On the other hand, economic development measured by real Gross Domestic Product is favourable to peace. Higher-income that translates to higher prosperities in an economy is expected to create peaceful coexistence among citizens, especially if complimented with equitable distribution. Throughout the estimated models, the behaviour of the variable is consistent and significant at 1% level.

Inflation, as a measure of the level of uncertainty is conducive for peace and significant columns (2–3) as shown in [Table 2](#). This negates conventional wisdom and contradicts [Huang and Throsby’s \(2011\)](#) result. This contradictory empirical relationship suggests the existence of a trade-off between inflation and unemployment in line with the Philips’ Curve theory. An increase in inflation will result in decreasing rate of unemployment, which has a positive multiplier effect on the level of income and wellbeing of an individual and thus, on peace.

Resource abundance, measured by total natural resource rents, is unfavourable to the existence of peace. In columns 1 and 2, the availability of natural resources significantly deteriorates the existence of peace, while in column 3, the effect is insignificant. Struggle over the ownership of strategic resources among citizens in the absence of a well-defined property right is bound to cause conflicts. Viewed from another perspective, resource abundance is associated with rent-seeking, corruption and higher opportunity for looting, a situation that [Oasis \(2012\)](#) has likened to the resource curse, thereby increasing the probability of occurrence of political crisis ([Paola et al., 2020](#)). Most conflicts in Africa are either ethnic-driven or a result of the struggle for political power. Resource constraint, which measures the degree of resource scarcity, also indicates that a lower degree of scarcity significantly increases the chances of peace. African countries are underdeveloped with little or no adaptation strategies to mitigate the devastating negative impact of shocks from climate change. An increasing rate of resource scarcity like rain, arable lands for agricultural activities, and other natural resources necessary for survival bring about low income, food insecurity, and deterioration of livelihood, all of which result in social fragmentation and land grabs, which provides the motivation for war and violence.

Columns 2 and 3 present the results of the interaction terms. In column 3, where property rights is interacted with natural resource abundance, the variable still exerts a significant deteriorating impact on the level of peace. It is worthy of note that property rights in Africa are weak and unable to protect the rights of the weak and the minority from the marginalization of the few privileged citizens, thereby fuelling violence/revolts by aggrieved parties. It is also important to note the change in the behaviour of LNRE from a negative sign in column 1 to a positive and significant function of peace in column 2. The result implies that, controlling for property rights, the presence of natural resource

**Table 3**  
Results of the estimated growth equation.

Dependent variable: LNGR			
Variable	(5)	(6)	(7)
LNGR (-1)	0.5159*** (13.0108)	0.5986*** (11.1171)	0.4949*** (14.9697)
LNSPC	0.1264*** (7.9564)	0.080880 (5.4216)	0.1518*** (6.2831)
LNHC	0.5182*** (8.3643)	0.4554*** (5.3064)	0.6427*** (7.5944)
PEACE	0.0452*** (2.6136)	-0.0129 (-0.5528)	0.0025 (0.0829)
LNPR	-0.0094 (-1.0809)	0.1141*** (4.2240)	-0.0285*** (-2.0977)
LNRE	0.0446*** (4.1527)	0.178497*** (4.5753)	0.0591*** (3.2982)
INT	0.0012*** (2.3469)	0.0002 (0.7190)	0.0003 (0.5291)
INF	0.0019*** (2.2656)	0.00073 (0.0832)	0.0012 (1.4544)
LNGINT	0.0291 (1.1867)	0.0796 (1.0056)	0.1250 (0.7172)
RC	-0.0018*** (-3.9922)	-0.0009*** (-1.8622)	-0.00157 (-1.9737)
PR*RE		-0.0423*** (-3.4677)	
Diagnostic Statistics			
Instruments Rank	32	31	34
J. Stat.	28.7305	15.74180	24.8456
J. Stat. Prob.	0.1527	0.732508	0.4142
AR(2) Prob.	0.1110	0.102161	0.0003
AR(2) Prob.	0.2331	0.2293	0.9998

Note: \*\*\*, \*\* and \* denote significant at 1%, 5% and 10% respectively. Figures in parentheses represent t-statistics. Columns 5–6 were estimated using system-GMM, while column 7 was estimated using Difference GMM.  
Source: Authors' computations.

abundance would result in greater peace. In Africa, resource abundance has been viewed as a curse rather than a blessing. The same explanation is provided for the result of the interaction term (PR\*RC) in column 3. Therefore, the low quality of property rights underscores the deteriorating influence of both resource abundance and constraints on peace. The result of the dynamic term (Peace (-1)), indicates that the previous years' peace significantly improves the level of peace in the present year, all things being equal.

As a robustness check, we estimated the first difference GMM as shown in column 4. The results mimic our earlier empirical findings using system GMM except for POV and inflation that exhibit an insignificant positive impact and significant negative impact respectively. The estimated coefficient of PR using difference GMM still suggests that property rights are conducive to peace and the result is significant at 1%. Therefore, it is concluded that well-defined property rights is germane for the existence of peace.

In Table 3, the results of the estimated growth equation are presented.

From Table 3 (column 5), peace is a significant positive function of growth, while in column 6, the impact is negative but insignificant. The result of the difference GMM, which was used as robustness check, further confirms the positive relationship between growth and peace. Government integrity exerts a positive but insignificant impact on economic growth. Property rights, on the other hand, indicate an insignificant negative impact on growth as revealed in column 5, while in column 6, the impact is positive and significant at 1%. The result in column 7, further confirms a significant negative influence of property rights on economic growth. It could be concluded that the quality of institution and by extension property rights is a significant factor explaining Africa's growth trajectory. This corroborates the conventional wisdom that institutions are crucial for economic prosperity (Ruba & Andrew, 2020; Acemoglu et al., 2001).

The two traditional growth variables (human and physical capital) and natural resource abundance are significant positive functions of growth. These impacts are significant at 1% across all the specifications. The result is in line with Lederman and Maloney (2008) and contradicts Sachs and Warner (2001). Lederman and Maloney (2008) conclude that resource endowments are assets for economic prosperity if complemented with adequate human and physical capital, policies, and effective institution. In column 6, we control for institutions to test the Lederman and Maloney (2008) proposition by interacting natural resource abundance with property rights. The result indicates that resource abundance on its own is an asset for growth, while the coefficient of resource abundance interacted with property rights has a negative significant impact on economic growth. This implies the declining impact of natural resources on development in Africa (resource curse) could be explained by the quality of their institutions (property rights). Thus, the abundance of natural resources in an economy is a curse only in the presence of weak institutions. This result provides empirical evidence for the conclusion in development economics that the paradox of plenty only turns to resource-curse in the absence of good institutions (Amiri et al., 2019).

Resource scarcity tends to vary directly with the level of income at 1% level of significance. Empirical studies have also confirmed a positive relationship between economic growth and environmental degradation. This is particularly the case in Africa, where the majority are poor and solely rely on the exploitation of natural resources for survival. Therefore, the rate of resource constraints due to environmental pollution in the region is reflective of the rates of economic growth in line with Olarinde et al. (2014). Finally, social infrastructure (proxied by the number of people with access to internet facilities) is a significant positive function of growth in column 5, while in columns 6 and 7 the impact is positive but insignificant.

The results of the diagnostic checks in both the difference GMM and System-GMM indicate that there are no second-order serial correlation problems, given the the p-values of the AR(2) tests. Additionally, the insignificant p-values of the Sargan tests suggest the validity of the instruments used, indicating that the estimated equations are adequately specified.

## 5. Conclusion

This study investigates, using separate panel regression, the impact of property rights (as an indicator of institutional quality) on peace, and economic growth of African countries from 2008 to 2019. Covering 31 countries, the study used the system GMM technique for analysis. The study argues that while economic factors might be responsible for the absence of peace, they are inadequate in explaining the causes of the deteriorating level of peace in a continent bedevilled with high poverty, a feature of weak property rights. The empirical findings show that infant mortality and natural resource abundance are significantly inimical to peace while rising income and property rights are favourable.

The result of the interacting term shows that the negative impact of natural resource abundance on peace is attributed to low quality of property rights. The estimated growth equation indicates that peace, human and physical capital, natural resource endowment, and government integrity positively impact economic growth, while property right is a declining function. The interacting term (PR\*RE) also exerts a negative impact on economic growth.

Although poverty might be a significant factor responsible for the deterioration of peace in Africa, the higher magnitudes of the impact of natural resource abundance on peace indicate that the deteriorating level of peace in the region is a function of resource curse rather than poverty. Also, the negative impact of property rights on economic growth on one hand and its deteriorating effects on the contribution of the natural resources to economic growth on the other further are indicative of the fundamental roles of property rights as the underlying factor that determines the level of income. Thus, the study argues that

lack of well-defined property rights, and poor government integrity combine to explain the negative impact of natural resource abundance on growth.

To address the deteriorating level of peace and increase the economic prosperity of Africa, policies that improve the quality of property rights and government integrity should be pursued. This will help to address the presence of resource-curse syndrome associated with countries in the continent. Consequently, a multifaceted approach is required in Africa in an attempt to strengthen property rights. Existing customary systems need to be enhanced and strengthened, especially as it relates to land ownership, given the place of land in Africa’s institutional architecture and the role it has played in various conflict situations.

Moreover, the role of the African Union in the maintenance of peace in Africa through its organ, Peace and Security Council, should be strengthened, to promote the prevention, management, and conflict resolution. By strengthening the organ, it will be better equipped to deploy mechanisms encompassing deployment of peacekeeping forces, early warning systems and mediation, all of which are critical at peace-building.

It is important to emphasise that this study is not without limitations. The first issue relates to the variables used. For example, the major determinants of peace in Africa aside institutions include good governance, conflicts arising from poverty and inequality, as well as social inclusion. In addition there are the complex issues of ethnic diversity and historical colonial legacies, which contribute to conflicts and consequently on the state of peace in the continent. Future studies incorporating these variables (given the availability of data) are likely to shed more light on the analysis of peace in Africa. In the case of

economic growth, there are several important factors that have been uncovered in the extant literature, including Research and development (R&D), macroeconomic factors fiscal policy, budget deficits and tax burdens, openness and Foreign Direct Investment (FDI). Controlling for these variables in future studies might uncover other mechanisms through which peace and the associated variables impact the growth of the continent. Finally, it might be useful to test the impact of institutional quality on peace using alternative econometric approaches, especially where data for a long period of time on the variables used in this study become available. In this context, the use of cointegration techniques and non-linear frameworks might shed further light on the impact of property rights on peace on one hand, and economic growth on the other hand.

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**CRedit authorship contribution statement**

**Martins Iyoboyi:** Writing – original draft, Software, Methodology, Formal analysis. **Muftau Olaiya Olarinde:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization.

**Declaration of competing interest**

The authors declare that they have no competing interests.

**Appendix 1. Countries used in the study**

Algeria, Benin, Burkina Faso, Burundi, Cameroon, Congo, Congo Rep, Cote d’Ivoire, Egypt, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Morocco, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Togo, Tunisia, Zimbabwe

Source: Authors’ compilation.

**Appendix 2. Descriptive statistics**

	PEACE	LNPR	LNPOV	LNDR	LNRE	LNFFI	RC	INF	LNSPC	INT	LNGINT
Mean	-1.825025	3.360132	3.836129	23.48961	2.367450	4.198190	0.403055	5.853076	21.96100	15.33535	3.349688
Maximum	-0.749000	4.245630	4.760460	26.87470	4.082080	5.068170	1.957910	29.50190	25.18860	64.80390	4.114150
Minimum	-4.000000	1.609440	2.681020	20.48140	0.487540	1.777340	0.079640	-2.814700	17.86340	0.250000	2.302580
Observations	341	341	341	341	341	341	341	341	341	341	341

Source: Authors’ computations.

**Appendix 3. Covariance analysis (Kendall’s tau)**

Sample: 2008-2018  
Included observations: 341

	PEACE	LNPR	LNSPC	LNGINT	LNHC	LNPOV	LNFFI	LNRE	RC	INT	LNDR
PEACE	1.000										
LNPR	-0.324	1.000									
LNSPC	0.076	0.276	1.000								
LNGINT	-0.313	0.487	0.207	1.000							
LNHC	0.218	0.180	0.514	0.022	1.000						
LNPOV	0.179	-0.338	-0.319	-0.380	-0.113	1.000					

(continued on next page)

(continued)

Sample: 2008-2018

Included observations: 341

	PEACE	LNPR	LNSPC	LNGINT	LNHC	LNPOV	LNFFI	LNRE	RC	INT	LNGR
	0.000	0.000	0.000	0.000	0.002						
LNFFI	-0.062	0.199	0.332	0.306	-0.011	-0.375	1.000				
	0.090	0.000	0.000	0.000	0.768	0.000					
LNRE	0.108	-0.300	-0.189	-0.243	-0.157	0.276	-0.169	1.000			
	0.003	0.000	0.000	0.000	0.000	0.000	0.000				
RC	-0.099	0.128	0.195	0.178	0.036	-0.241	0.315	-0.101	1.000		
	0.007	0.001	0.000	0.000	0.317	0.000	0.000	0.005			
INT	-0.080	0.307	0.447	0.359	0.162	-0.507	0.630	-0.285	0.305	1.000	
	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
LNGR	0.078	0.284	0.830	0.180	0.573	-0.328	0.329	-0.228	0.202	0.457	1.000
	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Source: Authors' computations.

**Appendix 4. Covariance and correlation (ordinary)**

Included observations: 341

Covariance

Correlation

Probability

	PEACE	LNPR	LNSPC	LNGINT	LNHC	LNPOV	LNFFI	LNRE	RC	INTR	LNGR
PEACE	0.107										
	1.000										
	-										
LNPR	-0.062	0.216									
	-0.406	1.000									
	0.000	-									
LNSPC	0.070	0.225	2.695								
	0.131	0.295	1.000								
	0.016	0.000	-								
LNGINT	-0.039	0.075	0.139	0.077							
	-0.425	0.584	0.304	1.000							
	0.000	0.000	0.000	-							
LNHC	0.131	0.074	1.321	-0.002	1.322						
	0.349	0.139	0.700	-0.005	1.000						
	0.000	0.010	0.000	0.931	-						
LNPOV	0.038	-0.083	-0.333	-0.063	-0.055	0.187					
	0.268	-0.410	-0.469	-0.523	-0.111	1.000					
	0.000	0.000	0.000	0.000	0.041	-					
LNFFI	-0.026	0.066	0.385	0.064	-0.052	-0.124	0.328				
	-0.137	0.247	0.409	0.399	-0.080	-0.501	1.000				
	0.011	0.000	0.000	0.000	0.142	0.000	-				
LNRE	0.051	-0.147	-0.329	-0.080	-0.191	0.140	-0.112	0.626			
	0.196	-0.400	-0.254	-0.362	-0.210	0.409	-0.247	1.000			
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-			
RC	-0.013	0.024	0.199	0.022	0.060	-0.048	0.063	-0.044	0.081		
	-0.144	0.183	0.427	0.280	0.184	-0.388	0.385	-0.194	1.000		
	0.008	0.001	0.000	0.000	0.001	0.000	0.000	0.000	-		
INTR	-0.699	2.893	15.617	2.045	3.743	-4.680	5.873	-5.679	1.901	250.857	
	-0.135	0.393	0.601	0.464	0.206	-0.683	0.647	-0.453	0.422	1.000	
	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	
LNGR	0.073	0.216	2.440	0.113	1.319	-0.303	0.357	-0.364	0.186	14.749	2.344
	0.146	0.303	0.971	0.264	0.749	-0.458	0.407	-0.300	0.429	0.608	1.000
	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-

Source: Authors' computations.

## Appendix 5. Endogeneity test results

H0: Variables are exogenous		
Model 1		
Test	Statistic	Probability value
Durbin (score) chi2(1)	7.21434	0.0072
Wu-Hausman F(1,301)	7.17179	0.0078
Model 2		
Test	Statistic	Probability Value
Durbin (score) chi2(1)	4.65142	0.0310
Wu-Hausman F(1,299)	4.55472	0.0336

Source: Authors' computation.

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