International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2023, 13(3), 109-116.

How do Natural Resource Abundance and Agriculture Affect Economic Growth in Guinea?

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Received: 03 February 2023 **Accepted:** 24 April 2023 **DOI:** https://doi.org/10.32479/ijefi.14302

ABSTRACT

This article investigates the asymmetric effects of both natural resource abundance and agriculture on economic growth in Guinea (also known as Guinea Conakry). Using the nonlinear autoregressive distributed lag (NARDL) approach on annual data from Guinea over the period 1986-2020, the findings tend to suggest that natural resource abundance has a negative effect on economic growth while agriculture promotes economic growth. More precisely, the results show that an increase in natural resource rents leads to a decrease in GDP per capita in both the short and long run while a decrease in natural resource rents increases economic growth in the long run. Concerning agriculture, the results reveal that a positive shock in agricultural added value increases economic growth in both the short and long run while a negative shock in agricultural added value leads to a decrease in economic growth in both the short and long run.

Keywords: Resource Curse, Natural Resources, Agricultural, Agriculture, ARDL, NARDL
JEL Classifications: O55, Q10, Q32

1. INTRODUCTION

Natural resource abundance can act as a blessing or curse. Due to poor economic performance of some resource-rich countries and the mixed results on this issue, the effect of natural resources on economic development remains very controversial. Generally, resource-rich developed countries are seen as examples of the resource blessing while resource-rich developing countries are seen as examples of the resource curse. Several factors are considered as the main causes of the resource curse such as the Dutch disease (when a resource boom negatively affects other sectors of the economy), commodity price volatility, and poor institutions (Corden and Neary, 1982; Corden, 1984; Koren and Tenreyro, 2007; Sachs and Wagner, 1995; Van Der Ploeg and Poelhekke, 2009; Arezki and Van Der Ploeg, 2010; Frankel, 2012; Dwumfour and Ntow-Gyamfi, 2018; Mien and Goujon, 2022). The resource curse concept can be extended to agriculture potentials. Because, some countries (especially sub-Saharan Africa), despite huge agricultural, fishery, and forestry potentials, experience poor economic performance. Agriculture is often considered as one of the key sectors of an economy (World Bank, 2007; Harsmar, 2022). In developing countries, the contribution of agriculture to economic growth is often low relative to its potential. Indeed, in developing countries, agriculture suffers from low productivity due to the lack of investment, low levels of education and professional skill training, and the lack of infrastructure (World Bank, 2004; 2020). For instance, in sub-Saharan Africa, agriculture is mainly practiced by small farm holdings with rudimentary production techniques.

Many empirical studies focused on the impacts of both natural resources and agriculture on economic growth. However, to the best of our knowledge, until now there almost no study focused on the case of Guinea. This study attempts to fill these gaps. Indeed, Guinea is providing a good study case on this issue for several reasons. First, Guinea is among the poorest countries in the world. Second, Guinea has huge agricultural, fishery, and forestry potentials. Third, Guinea is home to tremendous mineral resources (included bauxite, iron, gold, and diamond). Furthermore, Guinea is experiencing mining boom for several years. Mineral resources and agriculture play a key role in the Guinean economy for several decades.

In 2018, the mining sector represented 18.4% of the Guinea's GDP (EITI Guinea, 2020). Guinea was the second world's largest bauxite producer after Australia in 2020 (according to data from US Geological survey). Guinea also was the 18th world's largest gold producer in 2021 (according to data from the World Gold Council), and the 13th world's largest diamond producer (IMF, 2021). Iron ore proven reserves in Guinea are estimated over 20 billion tons (the world largest untapped reserves). However, despite its huge mineral resources, Guinea remains among the least developed countries in the world. For instance, in 2021, Guinea ranked 182nd out of 191 in the Human Development Index (Human Development Report, 2021).

Concerning agriculture, it represented about 20% of the Guinea's GDP (World Bank, 2016). Guinea has a huge agricultural potential, among others, abundant water resources and rainfall (19000 m^3 per capita and per year) (World Bank, 2020), various climatic conditions, and soil highly fertile. However, despite this huge agricultural potential, agricultural productivity is very low in Guinea due, among others, to the lack of investment in inputs (high yield seed, fertilizer, and mechanization) and the lack of infrastructure (World Bank, 2004). Guinea's agricultural sector has one of the world's lowest ratios of labor productivity compared to economic-wide productivity (World Bank, 2004). For instance, 80% of the labor force (the share of the agriculture sector of the labor force) generated only 20% of GDP (World Bank, 2016).

This article contributes to the existing literature by assessing the asymmetric effects of both natural resources and the agriculture sector on economic growth in the case of Guinea. The findings from this study are expected to help policymakers to better understand how both mineral resources and the agriculture sector affect Guinea's economy and to design appropriate strategies to boost the contribution of both sectors to economic growth. Additionally, our findings could have significant implications for other developing countries with similar mineral and agricultural potentials. Given both tremendous natural resources and huge agricultural potential in Guinea, we hypothesize that both natural resources and agriculture positively affect economic growth in Guinea. However, due to the existence of the resource curse phenomenon in many resource-rich developing countries, a negative impact of both sectors on economic growth might also be expected. As methodology, we use the nonlinear autoregressive distributed lag (NARDL) approach on annual data from Guinea over the period 1986-2020. This approach is robust and better perform for small sample sizes such as that used in this study. Additionally, unlike the autoregressive distributed lag (ARDL) approach, the NARDL approach allows to examine separately positive and negative changes in independent variables on dependent variable.

The remainder of this article is organized as follows: Section 2 presents a brief review of literature on our issue. Section 3 outlines data and methods. Section 4 reports and discusses the empirical results. Section 5 concludes the research with policy implications.

2. LITERATURE REVIEW

2.1. Natural Resource Abundance and Economic Growth

Poor economic performance of many resource-rich developing countries suggests that natural resource abundance is not necessarily a blessing. In the literature, this phenomenon is known as the "resource curse" (also known as the "paradox of plenty"). The "resource curse" refers to a situation in which economic performance of a resource rich country is poorer compared to resource poor countries. The "Dutch disease", price and production volatility, weak institutions, and corruption are among the main causes of the resource curse (Sachs and Wagner, 1995; Van Der Ploeg and Poelhekke, 2009; Arezki and Van Der Ploeg, 2010; Frankel, 2012). In the literature, the evidence of the existence of the resource curse is controversial. Indeed, for several decades, a growing number of empirical studies focused on the effect of natural resource abundance on economic growth. Overall, the results are mixed and remain inconclusive. For instance, on 605 regression estimates, Havranek et al. (2016) found a negative and significant impact for 40% of regressions, a positive and significant impact for 20% of regressions and an insignificant impact for 40% of regressions. Overall, the empirical results on the relationship between natural resource abundance and economic growth do not seem to be sensitive to the type of resource (oil, mineral resources, or natural resources as a whole). For instance, concerning oil, Apergys and Payne (2014) using time-varying cointegration on MENA countries from 1990 to 2013 found that oil reserves have a negative impact on economic growth between 1990 and 2003, and a positive impact on economic growth between 2003 and 2013.

Eregha and Ekundayo (2016) using panel data from five major oil producing African countries (Nigeria, Angola, Algeria, Egypt, and Libya) over the period 1993-2013 investigated the relationship between oil export and economic growth. They concluded that oil export per capita and net oil export have a negative impact on economic growth. In contrast to this study, other studies found a positive relationship between oil abundance and economic growth. For instance, Hamdi and Sbia (2013) examined the relationship between oil revenues and economic growth in the case of Bahrain between 1960 and 2010. Using error correction model (ECM), their results showed that there is a positive relationship between oil revenues and economic growth. Arin and Braunfels (2018) studied the impact of oil rents on economic growth using a Bayesian model on 91 countries between 1970-2014. Their results revealed that oil rents have a positive impact on economic growth in the long run. Concerning natural resources (as a whole), the results also remain mixed. For instance, Kim and Lin (2017) used various panel techniques on 40 developing countries from 1990 to 2012 to investigate the relationship between natural resources and economic development. The results suggested that primary exports and natural resource rents have a negative impact on economic development. In contrast to this study, other studies suggested a positive relationship between natural resource abundance and economic growth. For instance, Ji et al. (2014) used various panel techniques on 28 Chinese provinces over the period 1990-2008 to investigate the relationship between natural resource abundance and economic growth. The results showed that natural resource abundance has a positive impact on economic growth. Bah (2016) analyzed the relationship between economic growth and natural resource dependence using vector error correction model (VECM) and cointegration test on data from Sierra Leone over the period 1975-2014. The results indicated that there is a positive relationship between natural resource dependence and economic growth.

Concerning Guinea, using both autoregressive distributed lag (ARDL) and nonlinear autoregressive distributed lag (NARDL) approaches on annual data from Guinea over the period 1986-2020, Camara (2022) concluded that, overall, bauxite production has a significant and positive impact on economic growth in the short run, but this impact is insignificant in the long run.

2.2. Agriculture and Economic Growth

Agriculture has long been considered as a major sector in any economy. This is particularly the case of Physiocrats who perceived agriculture as the backbone of any economy. Agriculture can contribute to the economy through four ways: product contribution, market contribution, factor contribution and foreign exchange contribution (Abdullahi, 2002; World Bank, 2007). In many developing countries (especially sub-Saharan Africa), agriculture is the predominant activity. In 2019, agriculture represented over 52% of employment in Sub-Saharan Africa (according to data from the World Bank) and it is generally the main source of income in rural areas. However, in most of African countries, agricultural activities are dominated by subsistence production.

In the literature, there is no consensus on the relationship between agriculture and economic growth (Stertoglu et al., 2017). Indeed, some empirical studies (e.g., Dim and Ezenekwe, 2013; Aggrey, 2019) showed mixed results or an insignificant impact of agriculture on economic growth while others (e.g., Awokuse, 2009; Stertoglu et al., 2017; Getahun et al., 2018) suggested a positive effect of agriculture on economic growth. For instance, Awokuse (2009) examined the relationship between agriculture and economic growth on data from 15 developing countries and transition economies over the period 1971-2006. Using autoregressive distributed lag (ARDL) model, the results showed that agriculture boosts economic growth only in 10 countries. Aggrey (2009) used annual data from Uganda over the period 1987-2007 to study the relationship between agriculture and economic growth. Using trend and regression analysis tools, the results suggested that agriculture has an insignificant impact on economic growth in Uganda. Stertoglu et al. (2017) investigated the relationship between agriculture and economic growth on data from Nigeria over the period 1981-2013 using vector error correction model (VECM). The results revealed that agriculture positively affect economic growth in Nigeria. Using fully modified ordinary least squares (FMOLS) model and Granger causality, Getahun et al. (2018) used data from 44 African countries over the period 1961-2014 to examine the relationship between agriculture and economic growth. Their results indicated that agriculture promotes economic growth.

3. DATA AND METHODOLOGY

3.1. Data and Descriptive Statistics

The current study uses annual data from Guinea over the period 1986-2020. All data are obtained from the World Bank database (Table 1).

Table 2 gives the main descriptive statistics for all variables used in this study. The mean of GDP per capita (GDP) is 673.37 $ US with a standard deviation of 119.278 $ US. For the share of natural resource rents in GDP (RES), the mean is 15.616% with a standard deviation of 4.666 points. Concerning agricultural added value per capita (AGR), the mean is 115.095 $ US with a standard deviation of 29.952 $ US.

3.2. Methodology

The aim of this study is to investigate the asymmetrical relationship between natural resources, agriculture and economic growth in Guinea. For this purpose, we use an econometric approach. GDP per capita (GDP) is used as dependent variable. Both natural resource rents (RES) and agricultural added value (AGR) are used as variables of interest. Both these variables are often used in empirical studies as proxies of natural resource abundance and the agriculture sector, respectively. In addition to both these variables of interest, the share of goods and services exports in GDP (EXP) is included in the model as control variable. We transform all variables into a natural logarithm (Equation 1). That allows coefficients of independent variables to be interpreted as elasticities in our regressions.

$$\ln GDP_t = \alpha_0 + \alpha_1 \ln RES_t + \alpha_2 \ln AGR_t + \alpha_3 \ln EXP_t + \varepsilon_t \quad (1)$$

To check the asymmetrical relationship among our variables, we employ the non-linear autoregressive distributed lag (NARDL) approach which is the asymmetric form of the autoregressive distributed lag (ARDL) approach (Equation 2). ARDL model was developed by Pesaran et al. (2001) while NARDL model was developed by Shin et al. (2014). ARDL model can be specified as follows:

Table 1: Description of variables

Name of variable	Symbol	Unit	Source
Natural resource rents	RES	% of GDP	World Bank
Gross domestic product	GDP	Constant US$	World Bank
Population	POP	Inhabitants	World Bank
Agriculture (included forestry, and fishing) added value	AGR	Constant US$	World Bank
The share of goods and services exports in GDP	EXP	% of GDP	World Bank

Table 2: Summary statistics

Variables	Obs.	Mean	SD	Min	Max
RES	35	15.616	4.666	4.126	25.401
GDP*	35	673.370	119.278	526.039	962.116
AGR*	35	115.095	29.952	83.781	199.228
EXP	35	28.269	7.732	19.195	58.809

*Value per capita. SD: Standard deviation

$$\Delta \ln GDP_t = \alpha_0 + \sum_{k=1}^{n1}\beta_k \Delta \ln GDP_{t-k} + \sum_{k=0}^{n2}\delta_k \Delta \ln RES_{t-k} + \sum_{k=0}^{n3}\vartheta_k \Delta \ln AGR_{t-k} + \sum_{k=0}^{n4}\theta_k \Delta \ln EXP_{t-k} + \varphi_1 \ln GDP_{t-1} + \varphi_2 \ln RES_{t-1} + \varphi_3 \ln AGR_{t-1} + \varphi_4 \ln EXP_{t-1} + \varepsilon_t \quad (2)$$

where: β, δ, ϑ and θ correspond to the short-run parameters. ϕ_1 to ϕ_4 correspond to the long-run parameters. *t* corresponds to the time index. ε_t corresponds to the error term.

The NARDL approach has several advantages. It provides robust results even if the sample size is small. It allows data which include variables integrated of order zero I(0) and/or order one I(1) but not beyond. Multicollinearity among variables is avoided by using appropriate lag order for variables in regressions. Also, unlike the ARDL approach, the NARDL approach allows to capture both the short and long run asymmetries. Given commodity price volatility, the use of the NARDL approach can be meaningful and interesting in our study to distinguish between the effects of positive change in both natural resource rents and agricultural added value and those of negative change in both natural resource rents and agricultural added value on economic growth. For this purpose, each independent variable is decomposed into the positive partial sum and the negative partial sum. NARDL model can be specified as follows:

$$\Delta \ln GDP_t = \beta_O + \sum_{i=1}^{p}\theta_i \Delta \ln GDP_{t-i} + \sum_{i=0}^{p}\left(\pi_i^+ \Delta \ln RES_{t-i}^+ + \pi_i^- \Delta \ln RES_{t-i}^-\right) + \sum_{i=0}^{p}\left(\varphi_i^+ \Delta \ln AGR_{t-i}^+ + \varphi_i^- \Delta \ln AGR_{t-i}^-\right) + \sum_{i=0}^{p}\left(\rho_i^+ \Delta \ln EXP_{t-i}^+ + \rho_i^- \Delta \ln EXP_{t-i}^-\right) + \delta \ln GDP_{t-1} + \vartheta^+ \ln RES_{t-1}^+ + \vartheta^- \ln RES_{t-1}^- + \delta^+ \ln AGR_{t-1}^+ + \delta^- \ln AGR_{t-1}^- + \quad (3)$$

where:
$\ln RES^+$, $\ln AGR^+$ and $\ln EXP^+$ indicate the partial sum process of positive changes in independent variables while $\ln RES^-$, $\ln AGR^-$ and $\ln EXP^-$ indicate the partial sum process of negative changes in independent variables.

From equation 3, Error Correction Model (ECM) can be specified as follows:

$$\Delta \ln GDP_t = \beta_O + \sum_{i=1}^{p}\theta_i \Delta \ln GDP_{t-i} + \sum_{i=0}^{p}\left(\pi_i^+ \Delta \ln RES_{t-i}^+ + \pi_i^- \Delta \ln RES_{t-i}^-\right) + \sum_{i=0}^{p}\left(\varphi_i^+ \Delta \ln AGR_{t-i}^+ + \varphi_i^- \Delta \ln AGR_{t-i}^-\right) + \sum_{i=0}^{p}\left(\rho_i^+ \Delta \ln EXP_{t-i}^+ + \rho_i^- \Delta \ln EXP_{t-i}^-\right) + \gamma ECT_{t-1} + \varepsilon_t \quad (4)$$

where ECT_{t-1} indicates the error correction term. γ indicates the error correction term parameter. This coefficient indicates the speed of adjustment from the short run toward the long run equilibrium. The disequilibrium is caused by the shocks in the previous years. We expect that γ will be negative and statistically significant. ε_t indicates the error term.

4. RESULTS

4.1. Unit Root Tests

Table 3 reports the results of unit root tests for all variables. The Augmented Dickey-fuller (ADF) and Phillips-Perron (PP) tests were performed. The results indicated that all variables are stationary at the first difference.

4.2. Cointegration Test

Table 4 displays the cointegration test results. To test the presence of a nonlinear long run relationship among variables, we employ the F-test proposed by Pesaran et al., 2001. F-stat=6.517 is compared with the critical values proposed by Pesaran et al. (2001) and Narayan (2005). We observe that F-stat=6.517 is greater than both Pesaran et al. (2001) and Narayan (2005) critical values at least at 5%. This confirms the existence of cointegration among variables. In other words, there exists a long run asymmetrical relationship among variables.

4.3. Regression Results

Table 5 reports the results of the short run estimations of NARDL model. The results of diagnostic tests show that the model does not suffer from autocorrelation, heteroskedasticity, misspecification and non-normality at 5%. The coefficient of determination is very high (R^2=0.924). This means that the independent variables explain about 92.4% of the change in GDP per capita in Guinea. As expected, the coefficient of error correction term (ECT) is negative and significant at 1%. This means that any shock from long run equilibrium can be adjusted by about 100% over the next year.

The results indicate that in the short run, only a positive shock in natural resource rents significantly affects economic growth in

Table 3: Unit root test (with trend)

Variables	Augmented Dickey-Fuller		Phillips-Perron	
	Level	First difference	Level	First difference
ln (RES)	−0.929	−6.293***	−1.336	−4.504***
ln (GDP)	−0.130	−4.679***	−0.122	−4.594***
ln (AGR)	−1.319	−9.701***	−1.026	−9.287***
ln (EXP)	−2.363	−6.293***	−2.134	−6.477***

Test results generated by Stata. 17; Test statistic value; ***, ** and * denote significance at 1%, 5% and 10%, respectively

Table 4: Cointegration test

Test statistic	Significance level (%)	Pesaran et al. (2001) critical values		Narayan (2005) critical values	
		I (0)	I (1)	I (0)	I (1)
F-stat=6.517	1	4.29	5.61	5.19	6.84
K=3	5	3.23	4.35	3.61	4.91
	10	2.72	3.77	2.96	4.10

t_BDM (proposed by Banerjee *et al*., 1998) = −4893; Case III: Unrestricted intercept and no trend. The critical values from Pesaran *et al*., (2001) are more appropriate for large samples (Narayan, 2004), while those from Narayan (2005) are more appropriate for small sample sizes

Guinea. Indeed, we found that the coefficient of positive change in natural resource rents is negative (-0.068) and statistically significant at 5% while the coefficient of negative change in natural resource rents is statistically insignificant. This implies that a 1% increase in natural resource rents leads to a 6.8% decrease in GDP per capita in the short run. These findings suggest that natural resource abundance negatively affects economic growth in Guinea in the short run. This is consistent with several studies (e.g., Arezki and Van der Ploeig, 2010; Satti et al., 2013 and Shabbaz et al., 2019) and the resource curse hypothesis that resource abundance is associated with poor economic performance.

Concerning agriculture, both positive and negative shocks in agricultural added value have a significant impact on economic growth in the short run. However, the impact of a negative shock in agricultural added value is statistically more significant (at 1%) than that of a positive shock in agricultural added value (at 10%). Additionally, the results indicate that the magnitude of the impact of a negative shock in agricultural added value is also greater than that of a positive shock in agricultural added value. Indeed, according to the results, a 1% increase in agricultural added value leads to a 21% increase in GDP per capita in the short run while a 1% decrease in agricultural added value leads to a 55% decrease in GDP per capita in the short run. These findings imply that agriculture boosts economic growth in Guinea in the short run. This is in line with our expectations since the agriculture sector (despite the low productivity) is considered as one of the main drivers of economic growth and the first sector in terms of employment in Guinea for several decades (Campbell and Clapp, 1995; World Bank, 2004, 2016 and 2018).

Finally, the results reveal that only the impact of a positive shock in exports is statistically significant (at 5%) in the short run. According to these results, a 1% increase in exports increases GDP per capita by 8.5% in the short run. These findings mean that exports positively affect economic growth in Guinea in the short run. These findings are in line with some traditional theories in economics (in particular, those from classical economists) that trade has a positive impact on economic growth.

Table 5: Bound test for cointegration and the short run estimation results (ECM)

Dependent variable: GDP per capita		
Explanatory variables	**Coefficients**	**Standard errors**
Δln (GDP) (−1)	0.186	0.167
Δln $(RES)^+$	−0.068**	0.028
Δln $(RES)^+(-1)$	−0.010	0.035
Δln $(RES)^-$	−0.005	0.023
Δln $(RES)^-(-1)$	0.028	0.036
Δln $(AGR)^+$	0.211*	0.100
Δln $(AGR)^+(-1)$	−0.111	0.148
Δln $(AGR)^-$	0.551***	0.128
Δln $(AGR)^-(-1)$	0.104	0.119
Δln $(EXP)^+$	0.085**	0.031
Δln $(EXP)^+(-1)$	0.002	0.043
Δln $(EXP)^-$	−0.008	0.030
Δln $(EXP)^-(-1)$	0.036	0.049
ECT (−1)	−1.003***	0.205
R^2	0.924	
Diagnostic tests		
Autocorrelation, χ^2 (P-value)	10.77 (0.704)	
Heteroscedasticity, χ^2 (P-value)	1.917 (0.166)	
Ramsey RESET, F (P-value)	1.841 (0.210)	
Normality, χ^2 (P-value)	1.95 (0.377)	

***, **and * denote significance at 1%, 5% and 10%, respectively; Estimation results generated by Stata 17

Table 6 gives the results of the long run estimations. As in the short run, in the long run, the findings suggest a negative relationship between natural resource rents and economic growth in Guinea. Indeed, the coefficient of positive shocks in natural resource rents is negative (−0.11) and statistically significant (at 10%) while that of negative shocks in natural resource rents is positive (0.06) and statistically significant (at 5%). These results indicate that a 1% increase in natural resource rents leads to a decrease in GDP per capita by 11% in the long run while a 1% decrease in natural resource rents increases GDP per capita by 6% in the long run.

For agriculture, both positive and negative shocks in agricultural added value have a significant impact (at 1%) on economic growth in the long run. Additionally, the results show that the magnitude of the impact of a negative shock in agricultural added value is greater than that of a positive shock in agricultural added value. Indeed, the results reveal that a 1% increase in agricultural added value leads to a 44.8% increase in GDP per capita in the long run while a 1% decrease agricultural added value leads to a 81.1% decrease in GDP per capita in the long run. Thus, as in the short run, in the long run, agriculture boosts economic growth in Guinea. These findings further confirm our expectation that agriculture promotes economic growth in Guinea.

Finally, the results suggest a positive relationship between exports and economic growth in Guinea. However, only a negative shock in exports has a significant impact (at 1%) on economic growth in the long run. According to these results, a 1% decrease in exports leads to an increase in GDP per capita by 19.9% while an increase in exports by 1% boosts GDP per capita by 9.2% in the long run. Thus, even if the impact of positive shocks in exports is not statistically significant in the long run, these findings tend to show that exports positively affect economic growth in Guinea in the long run.

Table 7 gives asymmetry statistics. Wald test results confirm the presence of long asymmetric effects for all independent variables. Indeed, for both natural resource rents and exports, the results show that the asymmetrical relationship is significant (at least at 5%) in the long run. For agriculture, the results indicate that the asymmetrical relationship is significant (at least at 5%) in both

Table 6: The long run estimation results

Dependent variable: GDP per capita		
Explanatory variables	**Coefficients**	**Standard errors**
ln $(RES)^+$	−0.110*	0.055
ln $(RES)^-$	0.060**	0.028
ln $(AGR)^-$	0.448***	0.122
ln $(AGR)^-$	0.811***	0.159
ln $(EXP)^+$	0.092	0.057
ln $(EXP)^-$	−0.199***	0.057
Constant	6.342***	1.287

***, **and * denote significance at 1%, 5% and 10%, respectively; Estimation results generated by Stata 17

Figure 1: Cumulative effects of independent variables on GDP per capita

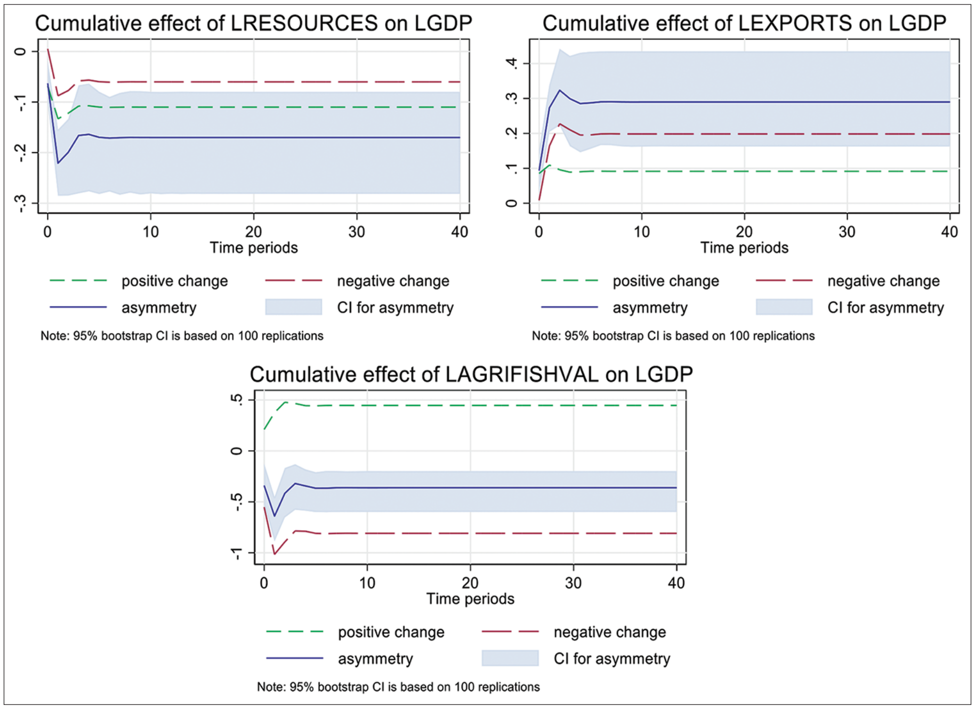

Table 7: Asymmetry statistics

Long run asymmetry		Long run effect	
$Wald_{SR, ln (RES),}$ F	1.983	ln $(RES)^+$	−0.110**
$Wald_{LR, ln (RES),}$ F	5.357**	ln $(RES)^-$	−0.060*
$Wald_{SR, ln (AGR),}$ F	6.762**	ln $(AGR)^+$	0.446***
$Wald_{LR, ln (AGR),}$ F	5.417**	ln $(AGR)^-$	−0.808***
$Wald_{SR, ln (EXP),}$ F	0.682	ln $(EXP)^+$	0.092
$Wald_{LR, ln (EXP),}$ F	9.123***	ln $(EXP)^-$	0.198***

***, **and * denote significance at 1%, 5% and 10%, respectively; Estimation results generated by Stata 17

the short and long run. This implies that, in the long run, overall, economic growth reacts differently to a positive and negative change in the independent variables. For natural resource rents, in the long run, a 1% increase in natural resource rents leads to a decrease in GDP per capita by 11% while a 1% decrease in natural resource rents leads to an increase in GDP per capita by 6%. Concerning agriculture, in the long run, an increase in agricultural added value by 1% increases GDP per capita by 44.6% while a decrease in agricultural added value by 1% increases GDP per capita by 80.8%.

Figure 1 shows cumulative effects of independent variables on GDP per capita. For all independent variables, asymmetrical effects are stable in the long run despite small fluctuations in the short run. Indeed, for natural resource rents, we note that both an increase (green line) and a decrease (red line) in natural resource rents have a negative effect on GDP per capita in the short run but these asymmetrical effects remain stable in the long run. For exports, both an increase (green line) and a decrease (red line) in this variable increase GDP per capita but these asymmetrical effects remain stable in the long run. Concerning cumulative effect of agriculture, an increase (green line) in agricultural added value increases GDP per capita in the short run but these asymmetrical effects remain stable in the long run. On the other hand, a decrease in agricultural added value (red line) decreases GDP per capita in the short run but like for the other variables, these asymmetrical effects remain stable in the long run. However, negative change in agricultural added value is stronger than positive change in agricultural added value (blue line).

5. CONCLUSION AND POLICY IMPLICATIONS

Mining and agriculture are vital sectors for many developing countries. However, generally, the transformation of mineral resources and agricultural potential into economic prosperity seems to be a real challenge given poor economic performance of most of these countries. Being one of the world's poorest countries despite both its huge natural resources and agricultural potential, Guinea is a meaningful case to investigate the relationship between natural resource abundance, agriculture, and economic growth in developing countries. To this end, the NARDL approach was employed on annual data from Guinea over the period 1986-2020. The main findings are that natural resource abundance negatively affect economic growth while agriculture promotes economic growth in Guinea.

For natural resource abundance, the results showed that the impact of a positive shock in natural resource rents has a negative and significant impact on GDP per capita in both the short and long run while the negative shocks in natural resource rents is statistically significant only in the long run. More precisely, a decrease in natural resource rents decreases GDP per capita in the long run. This means that natural resource abundance leads to poor economic performance in Guinea (this indicates the existence of the resource curse). These findings could be explained by, among others, nontransformation of raw materials into semi-finished goods or even finished goods before their exports, poor institutions, and high levels of corruption in Guinea.

Regarding agriculture, the findings suggested that agriculture promotes economic growth in Guinea. According to the results, a positive shock in agricultural added value increases GDP per capita in both the short and long run while a negative shock in agricultural added value leads to a decrease in GDP per capita in both the short and long run. This positive relationship between agriculture and economic growth could be explained by the role of this sector as one of the main drivers of economic growth in Guinea for several decades. Thus, our findings emphasize the key role of agriculture in Guinea's economy. However, we believe that this positive relationship is limited by low agricultural productivity in Guinea.

For exports, the results revealed that, in the short run, only a positive shock in exports has a significant impact on GDP per capita while in the long run, only a negative shock in exports has a significant impact on GDP per capita. According to the results, an increase in exports increases GDP per capita in the short run while, in the long run, a decrease in exports increases GDP per capita. These findings seem to show that there is a positive relationship between exports and economic growth in Guinea which is consistent with economic theories that highlight the contribution of trade to economic growth.

The findings of this study have relevant implications for policymakers. Concerning natural resources, policymakers should boost the contribution of mining to economic growth. For instance, they can lead mining companies to transform raw resources to semi-finished or even finished goods before their exports. Policymakers should also invest a significant share of revenues from mining activities in the priority sectors such as education, health, and transports infrastructure. Regarding agriculture, policymakers should increase the positive impact of agriculture on economic growth. For instance, to increase agricultural productivity, policymakers should tackle, among others, the lack of investment in inputs (high yield seed, fertilizer, and mechanization), low levels of education and professional skill training, and the lack of infrastructure in Guinea. For instance, to increase investments in agriculture, the government can collaborate with commercial banks to facilitate access to credit for farmers.

Future research should investigate the relationship between natural resources, agriculture, and poverty at local and regional levels (especially in mining areas) in Guinea. Such a study can help to understand the impact of mining and agriculture activities on the economy at local level.

REFERENCES

Abdullahi, E. (2002). Realizing the potential of agriculture in Nigeria. CBN Bulletin 26, 11-34.

Aggrey, N. (2019), Patterns of agricultural growth and overall growth of the Ugandan economy. African Journal of Agricultural Economics and Rural Development, 7(4), 1-10.

Apergys, N., Payne, J.E. (2014), The oil curse, institutional quality, and growth in MENA countries: Evidence from time varying cointegration. Energy Economics, 46, 1-9.

Arezki, R., Van der Ploeg, F. (2010), Do Natural Resources Depress Income Per Capita. CESIFO Working Paper No. 3056.

Arin, K.P., Braunfels, E. (2018), The resource curse revisited: A Bayesian model averaging approach. Energy Economics, 70, 170-178.

Awokuse, T.O. (2009), Does Agriculture Really Matter for Economic Growth in Developing Countries? In: 2009 Annual Meeting, July 26-28, 2009, Milwaukee Wilkinson 49762. Agricultural and Applied Economics Association.

Bah, C.M. (2016), Economic growth, institutions, and the natural resource curse in Sierra Leone: An empirical investigation. International Journal of Business and Social Science, 7(5), 1-10.

Banerjee, A., Dolado, J., Mestre, R. (1998), Error-correction mechanism tests for cointegration in a single-equation framework. Journal of Time Series Analysis, 19(3), 267-283.

Camara, M. (2022), Bauxite mining and economic growth in Guinea over the period 1986-2020: Empirical evidence from ARDL and NARDL approaches. Mineral Economics, 36, 157-179.

Campbell, B., Clapp, J. (1995), Guinea's economic performance under structural adjustment: Importance of mining and agriculture. Journal of Modern African Studies, 33(3), 425-449.

Corden, W.M. (1984), Booming sector and Dutch disease economics: Survey and consolidation. Oxford Economic Papers, 36(3), 359-380.

Corden, W.M., Neary, J.P. (1982), Booming sector and de-industrialisation in a small open economy. The Economic Journal, 92(368), 825-840.

Dim, C., Ezenekwe, U. (2013), Does agriculture matter for economic development? Empirical evidence from Nigeria. Journal of Finance and Economics, 1(1), 61-77.

EITI Guinea. (2020), Initiative Pour la Transparence Dans Les Industries Extractives de La République de Guinee. Rapport ITIE 2018.

Eregha, P.B., Ekundayo, P.M. (2016), Oil resource abundance, institutions and growth: Evidence from oil producing African countries. Journal of Policy Modeling, 38, 603-619.

Frankel, J.A. (2012), The Natural Resource Curse: A Survey of Diagnoses and Some Prescriptions. Faculty Research Working Paper Series. Bihar: RWP12-014.

Getahun, T., Baumuller, H., Nigussie, Y. (2018), From Agricultural to Economic Growth: Targeting Investments Across Africa. ZEF-Discussion Papers on Development Policy, No. 252.

Hamdi, H., Sbia, R. (2013), Dynamic relationships between oil revenues, government spending and economic growth in an oil-dependent economy. Economic Modelling, 35, 118-125.

Harsmar, M. (2022), Agriculture, Economic Growth, and Poverty Reduction. Working Paper. Sweden: The Expert Group for Aid Studies (EBA).

Havranek, T., Horvath, R., Zeynalov, A. (2016), Natural resources and economic growth: A meta-analysis. World Development, 88, 134-151.

Human Development Report. (2021), Uncertain Times, Unsettled Lives: Shaping our Future in a Transforming World. The 2021/2022 Human Development Report. United States: UNDP. Available from: https://hdr.undp.org/system/files/documents/global-report-document/hdr2021-22overviewenpdf.pdf

IMF. (2021), Guinea. IMF Country Report No. 21/146. Washington, DC: International Monetary Fund.

Ji, K., Magnus, J.R., Wang, W. (2014), Natural resources, institutional quality, and economic growth in China. Environmental and Resource Economics, 57, 323-343.

Kim, D.H., Lin, S.C. (2017), Natural resources and economic development: New panel evidence. Environmental Resource Economics, 66, 363-391.

Mien, E., Goujon, M., (2022), 40 years of Dutch disease literature: Lessons for developing countries. Comparative Economic Studies, 64, 351-383.

Narayan, P.K. (2004), Reformulating Critical Values for the Bounds F-statistics Approach to Cointegration: An Application to the Tourism Demand Model for Fiji. Discussion Papers.

Narayan, P.K. (2005), The saving and investment nexus for China: Evidence from cointegration tests. Applied Economics, 37(17), 1979-1990.

Pesaran, M.H., Shin, Y., Smith, R.J. (2001), Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289-326.

Sachs, J.D., Warner, A.M. (1995), Natural Resource Abundance and Economic Growth. NBER Working Paper 5398.

Satti, S.L, Farooq, A., Shabbaz, M. (2013), Empirical Evidence on the Resource Curse Hypothesis in Oil Abundant Economy. MPRA N 50150.

Shabbaz, M., Destek, M.A., Okumus, I., Sinha, A. (2019), An empirical note on comparison between resource abundance and resource dependence in resource abundant countries. Resources Policy, 60, 47-55.

Shin, Y., Yu, B., Greenwood-Nimmo, M. (2014), Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. In: Sickles R., Horrace W., editors. Festschrift in Honor of Peter Schmidt. New York: Springer.

Stertoglu, K., Ugural, S., Bekun, F.V. (2017), The contribution of agricultural sector on economic growth of Nigeria. International Journal of Economics and Financial Issues, 7(1), 547-552.

Van Der Ploeg, F., Poelhekke, S. (2009), Volatility and the natural resource curse. Oxford Economic Papers, 61(4), 727-760.

World Bank. (2004) Guinea: Strengthening Public Expenditure Management for Poverty Reduction and Growth. Public Expenditure Review, Africa Region, Report No. 27347.

World Bank. (2007), World Development Report 2008: Agriculture for Development. Washington, DC: World Bank. Available from: https://openknowledge.worldbank.org/handle/10986/5990 License: CC BY 3.0 IGO

World Bank. (2016), Guinea: Diagnostic Trade Integration Study (DTIS) Update: Back to Business. Final Report, Trade and Competitiveness Global Practice, Document of the World Bank. United States: World Bank.

World Bank. (2018), Republic of Guinea: Overcoming Growth Stagnation to Reduce Poverty. Systematic Country Diagnostic. United States: World Bank Group.

World Bank. (2020), "Creating Markets in Guinea", Generating Diversified Growth in a Resource-Rich Environment. United States: World Bank Group.