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Article

Does FDI Promote the Resource Curse in Nigeria?

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Abstract: This study investigated whether Foreign Direct Investment (FDI) supported the resource curse hypothesis in Nigeria. The precise methodological contribution was based on the Vector Error Correction and Granger causality test. The finding showed cointegration among the variables, whereas the speed of adjustment was slightly low. Similarly, natural resource to gross domestic product, FDI, and exchange rate unidirectionally Granger cause economic welfare, whereas bidirectional Granger causality is observed between indicators of natural resources to export, trade, and economic welfare. The results clearly indicate that FDI and natural resource management could improve economic wellbeing, although with a cost of volatility in the exchange rate and utilisation of resources. Thus, the study recommends the urgent need for effective and efficient management of the country's natural resources to attract foreign direct investment and generate growth that can contribute meaningfully to the welfare of the citizens. Likewise, there is a need to diversify oil resources to other non-natural resources for the economy to stimulate growth and reduce the vulnerability of the economy to external shocks.

Keywords: resource curse; FDI; natural resources; economic welfare; Granger causality; Nigeria



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1. Introduction

For decades, a plethora of research has investigated the paradox of how resource-rich developing countries fail to generate growth that would improve their socio-economic prosperity (Orogun 2010; Conde 2017; Onditi 2019; Rudra and Jensen 2011; Mejía Acosta 2013; Stevens et al. 2015; Shobande and Enemona 2021). A hypothesis known as 'the resource curse hypothesis' postulates how developing countries with an abundance of natural resources tend to have a slower economic growth than resource-poor countries (Asiedu 2002, 2004, 2006, 2013; Solarin 2020; Hussain et al. 2020; Adekoya 2020; Asif et al. 2020; Dogan et al. 2020; Guan et al. 2020; Xue et al. 2020; Shobande and Asongu 2022). This study investigates whether foreign direct investment (FDI) has promoted the resource curse hypothesis in Nigeria, hoping to provide new information that could help policymakers make an informed decision on how to effectively and efficiently utilise natural resources to stimulate growth, enhance sustainable development, and improve the overall wellbeing.

Nigeria has been greatly enriched with numerous oil reserves; mineral deposits; and precious metals and stones such as gold, diamond, platinum, iron, and bauxite (Watts 2004; Idemudia 2012; Olayungbo 2019; Okpanachi and Andrews 2012; Shobande and Enemona 2021). At the moment, Nigeria is Africa's largest producer of oil and the world's tenth largest crude oil producer and fifth largest exporter of liquefied natural gas (LNG) (BP 2019). Similarly, Nigeria's rich resources have always been attractive for foreign investors. However, the country has untapped mining resources owing to its underdevelopment and the inability of the sector to attract FDI. Simultaneously, the country's oil and gas industry contribute nearly 80% of the government revenues and 90% of the country's export earnings (Sala-i-Martin and Subramanian 2013; Porter and Watts 2017; Li et al. 2020; Adekoya 2020). These contributions are accompanied by the volatility of the oil and gas industry, which exposes the country to external shocks and impacts on its domestic currency through erosion in the exchange rate. Although the Nigerian government indicated its commitment

to developing other mineral resources and enhancing the economy's diversification, the efforts are yet to translate into meaningful growth. With the huge resource potential, it is expected that Nigeria could generate growth, which will improve their citizens' overall wellbeing; however, the case appears to be the opposite, as growth has been inexcusably prolonged. In addition, citizens' welfare has continued to deteriorate owing to fluctuations in domestic currency and inflationary pressure. While it is unclear if the country's inability to attract FDI has contributed to its wellbeing, it is important to investigate this link to reposition its economy.

Three reasons call for the urgent need to investigate whether FDI has contributed to Nigeria's resource curse. Firstly, most FDI drivers are based on ownership, location, and internalisation, which is a good motivating factor for investors in Nigeria. However, in past decades, experience has shown that most FDI inflows to Nigeria have been delayed or prolonged. In fact, several investors have pulled out their funds from the domestic market owing to the poor nature of the economy (Onyeukwu 2007; Onyeiwu and Shrestha 2004; Shobande and Asongu 2021). Secondly, Nigeria is the most favoured and third host economy in Africa, with a teeming population and large market size, driving demand for foreign-made goods. However, despite the motivating factor to invest, it appears that its infrastructure leads to the relocation of many investors. Thus, poor electricity and poor transportation have discouraged foreign investment in the country. Thirdly, with Nigeria's economy being heavily dependent on the oil sector, the vulnerable to global market volatility is likely to persist. Fourthly, most natural resources' exploration has attracted FDI from various multinational companies; however, evidence shows that this FDI has not translated into meaningful growth as the capital flight and repatriation of profit is observed (Asiedu 2013). Therefore, investigating whether the FDI natural resource curse exists is important to reposition their economy for improved growth and sustainable development.

In the empirical literature, two main channels are often identified as those through which FDI can constrain growth in resource-abundant nations. Firstly, the boom in natural resources has been linked to an appreciation in domestic currency, which makes exports less competitive in the global market. Meanwhile, the natural resource boom will affect investment in non-natural resources. However, the consistent crowding out of non-natural resources will put pressure on natural resources, leading to crowding out in FDI. Secondly, natural resources are robust to the business cycle (boom and bust), which may lead to exchange rate volatility and expose the economy to external shocks (see Sachs and Warner 1995, 2001). Additionally, a greater portion of natural resources in export earnings of products means less diversification of trade, which ultimately makes a nation more prone to economic shocks.

This study contributes to the empirical literature in several ways. Firstly, it investigates whether FDI has promoted the resource curse hypothesis in Nigeria. Secondly, the precise methodology contribution is based on the VAR/VEC Granger causality test. Our findings highlight the importance of FDI on economic growth in Nigeria. The channel through which FDI affects growth in Nigeria has been identified as the exchange rate and trade openness. The research is significant not only because it highlights how FDI can promote economic wellbeing, but also because it reveals the short- and long-term dynamics, which is vital for managing the Nigerian economy.

The remainder of this paper is organised as follows. Section 2 presents a concise literature review and research question of the study. Section 3 describes the data and methodology used in this study. Section 4 presents the results and discourse of the findings, while Section 5 concludes with recommendations.

2. Related Literature

Several studies have addressed the link between FDI, natural resources, and economic welfare. For example, Asiedu and Lien (2011) examined the link between a natural resource, FDI, and democracy for a panel of 112 developing countries for the period 1982–2017 using a linear dynamic panel data model. They discovered that democracy promotes FDI if and

only if the value of minerals and oil in total exports is less than some critical value. Similarly, [Büthe and Milner \(2008\)](#) examined FDI for a panel of 122 developing countries from 1970 to 2000 within the World Trade Organization. They reported that developing countries could speed up their growth by attracting FDI. [Ndikumana and Sarr \(2019\)](#) provide theoretical and empirical insights into the simultaneous increase in FDI and capital flight in Africa. Their study focused on a panel of 30 countries from 1970 to 2015 using random regression analysis and reported that natural resources were directly related to capital flights.

Using the Bayesian time varying parameter (TVP) model, [Olayungbo \(2019\)](#) examined the effects of oil revenue on economic growth in Nigeria for the period 1970 to 2015 and discovered that oil revenue has positively and significantly contributed to economic growth. [Anyanwu \(2012\)](#) examined FDI inflows and the resource curse hypothesis in Africa using the generalised method of moment (GMM) and feasible generalised least squares (FGLS). The author's empirical model attempts to predict FDI as a function of market size, trade openness, financial development, macroeconomic stability, exchange rate, infrastructure, and human capital, among other important indicators. The author's findings show that natural resource endowments and exploitation attract huge FDI into Africa during the period examined.

Focusing on China's outward FDI of more than 150 host countries for the period 1991 to 2009, [Wang and Yu \(2014\)](#) investigated the role of natural resources and technology and discovered that the interaction between institutional quality played a role in promoting natural resources during the examined period. [Anarfo et al. \(2017\)](#) investigated the role of infrastructure development and natural resources on FDI inflows in Ghana for the period 1975–2014, using the Prais–Winsten regression statistical procedure, which is meant to overcome autocorrelation and heteroscedasticity in the error term in the model, and discovered that infrastructural development and natural resources are drivers of FDI inflows in Ghana.

Using a panel cointegration framework, [Basu et al. \(2003\)](#) explored the link between FDI and growth for a panel of 23 developing countries and reported that a long run cointegrating relationship was found between FDI and gross domestic product (GDP) growth. Furthermore, [Bouoiyour and Rey \(2005\)](#) examined the link between the exchange rate, trade flows, and FDI in Morocco using the volatility standard deviation and misalignments as the difference between the exchange rate regimes. They reported that misalignments affect trade flows through overvaluation, which led to a reduction in Morocco exports during the period examined. [Eissa and Elgammal \(2020\)](#) examined the determinants of FDI in oil-dependent economies from 1990 to 2015 using a panel of six Gulf Cooperation Council countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates). They discovered a positive relationship between market growth, trade openness, inflation, infrastructure, oil price, and FDI.

Using a dynamic simultaneous equation model, [Omri et al. \(2014\)](#) investigated the causality link between CO₂ emissions, FDI, and economic growth for a panel of 54 countries from 1990 to 2011, covering three regional sub-panels: Europe and Central Asia; Latin America and Caribbean; and Middle East Africa, North Africa, and sub-Saharan Africa. Their finding shows bidirectional causality flows between FDI and economic growth in the region, except for the Middle East, North Africa, and sub-Saharan Africa panels. [Bokpin et al. \(2015\)](#) examined the impact of natural resources on FDI in Africa using annual data from 1980 to 2011. Their study employed the system GMM and reported that different natural resource measures impacted FDI inflows. Using a novel dataset of bilateral FDI inflows, [Aleksynska and Havrylchyk \(2013\)](#) showed that FDI from the South had a regional aspect compared with investment from the North.

A cursory look at the above literature shows mixed evidence on the link between FDI, natural resources, and economic growth. Many empirical studies have agreed on the existence of the resource curve hypothesis. However, whether the phenomenon is a short- or long-term one remains to be answered. Similarly, major works have a regional focus and

do not consider a specific country’s resource curse in empirical research. Thus, this study investigated whether FDI promoted the resource curse in Nigeria.

Research Questions

In light of the above empirical review, the hypothesis tested in this study was stated as

Question 1:

‘Does FDI promote resource curse in Nigeria?’

Question 2:

‘Is there a long-run relationship between FDI and economic welfare?’

Answering these research questions will help Nigeria in two ways. Firstly, it re-examines the root cause of economic inefficiency and redirects investment to the productive sector of the economy, which will, in turn, translate into growth and sustainable development. Secondly, the underdevelopment of their economy is currently reflecting on citizens’ wellbeing, and the answer can help attract investment that transforms the economy beyond thresholds.

3. Data and Methodology

Our analytical inquiry into the connectivity between natural resources, FDI, and economic welfare focus on Nigeria and data used covers the period 1980 to 2019. Economic welfare is the dependent variable and data are obtained from the Penn World Table (PWT, 9.1). Our economic welfare is computed using real domestic absorption, capital stock, and real total factor productivity (TFP). Natural resource data are obtained from the Central Bank of Nigeria (CBN). Aligning with the literature, natural resource is proxied with three main variables: natural resources to GDP, natural resources to export, and total natural resources (Asiedu and Lien 2011; Asiedu 2006, 2013; Bokpin et al. 2015; Ndikumana and Sarr 2019). Data for FDI are obtained from UNCTAD and are consistent with existing studies hypothesising the link between natural resources, FDI, and economic welfare (Asiedu 2006, 2013; Acheampong and Osei 2014; Aleksynska and Havrylchuk 2013; Poelhekke and Van Der Ploeg 2009, 2010; Asamoah et al. 2016). We included data on trade openness and real exchange rate sourced from the WDI. Detailed information on data is provided in Table A1 in Appendix A.

4. Methodology

4.1. Baseline Model

The relationship between natural resources, FDI, and economic welfare is well established in the resource curse hypothesis and is stated as follows:

$$ewf_t = f(nagdp_t, naexport_t, natotal_t, FDI_t, tro_t, exc_t) \tag{1}$$

where t is time, ewf_t is economic welfare, $nagdp_t$ is natural resource to GDP, $naexport_t$ is natural resources driven by export, $natotal_t$ is total natural resources, FDI_t is foreign direct investment, tro_t is trade openness, and exc_t is exchange rate. Next, we introduce the logarithm because all of the variables exhibit a natural logarithm, and Equation (1) is stated econometrically as follows:

$$lewf_t = \alpha_0 + \alpha_1 \ln agdp_t + \alpha_2 \ln aexport_t + \alpha_3 \ln atotal_t + \alpha_4 \ln FDI_t + \alpha_5 \ln tro_{i,t} + \alpha_6 \ln exc_t + \varepsilon_t \tag{2}$$

In Equation (2), ε_t is signified stochastic error term and is independent and identically distributed (normal distribution); $\alpha_0 | \alpha_{1-5}$ are parameters, α_0 is an intercept, while the coefficients $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5,$ and α_6 are the elasticity of determinants of economic welfare captured in the model. As the study is framed in Granger causality, it important to note that the variables are treated endogenously.

4.2. A Prior Expectation

This study verifies several facts supported by economic principles on the link between FDI and resource curse hypothesis in Nigeria. First, it is expected that natural resources driven by GDP positively impact economic welfare. A natural resource that encourages GDP growth is a sign of a vibrant economy. Moreover, this suggests that the natural-resource-driven GDP is anticipated to have an impact on people’s living standards. Natural resources driven by export are highly volatile and are expected to have a negative impact on economic welfare. Second, FDI is expected to positively impact economic welfare. This is because increased FDI is expected to support economic growth, which will then have an impact on the standard of living of the people. Third, the real exchange rate is expected to have a negative impact on economic welfare. This is because of the real exchange rate is highly volatile. Fourth, trade openness is expected to have a positive or negative impact on economic welfare. Trade openness is only positive if it promotes standard of living through a direct or indirect increase in income. On the contrary, trade openness may worsen economic welfare if it increases income inequality and threatens domestic productivity.

5. Empirical Strategy

5.1. Motivation

This study is framed in panel VAR/VEC Granger causality developed by Granger (1969). The approach has gained superiority in multidisciplinary studies, particularly in the field of energy and environmental sciences (Granger 1969; Bressler and Seth 2011; Dumitrescu and Hurlin 2012; Kuruppuarachchi and Premachandra 2016; Tekin 2012; Xie et al. 2014). Two reasons justify the use of this approach. First, it provides an avenue to determine the short and long dynamics of the variables. Second, it reveals the vector error correction term (VEC), which determines the variables’ convergence speed to their equilibrium position.

5.2. Time Series Modelling

In this section, the model in Equation (2) is respecified to capture the dynamics of the short- and long-run factors along with the speed of adjustment using vector error correction (VEC). Thus, Equation (2) is restated as 3–9.

$$\begin{aligned} \Delta lewf_t = & \alpha_{10} + \sum_{p=1}^k \alpha_{11p} \Delta lewf_{t-p} + \sum_{p=1}^k \alpha_{12p} \Delta lnagdpt_{t-p} + \sum_{p=1}^k \alpha_{13p} \Delta lnaexport_{t-p} + \sum_{p=1}^k \alpha_{14p} \Delta lnatotal_{t-p} \\ & + \sum_{p=1}^k \alpha_{15p} \Delta lFDI_{t-p} + \sum_{p=1}^k \alpha_{16p} \Delta ltro_{t-p} + \sum_{p=1}^k \alpha_{17p} \Delta lexc_{t-p} + \phi_1 ECT_{t-1} + \varepsilon_{1t} \end{aligned} \tag{3}$$

$$\begin{aligned} \Delta lnagdpt = & \alpha_{20} + \sum_{p=1}^k \alpha_{21p} \Delta lnagdpt_{t-p} + \sum_{p=1}^k \phi_{22p} \Delta lewf_t + \sum_{p=1}^k \phi_{23p} \Delta lnaexport_{t-p} \\ & + \sum_{p=1}^k \alpha_{24p} \Delta lnatotal_{t-p} + \sum_{p=1}^k \alpha_{25p} \Delta lFDI_{t-p} + \sum_{p=1}^k \alpha_{26p} \Delta ltro_{t-p} \\ & + \sum_{p=1}^k \alpha_{27p} \Delta lexc_{t-p} + \phi_2 ECT_{t-1} + \varepsilon_{2t} \end{aligned} \tag{4}$$

$$\begin{aligned} \Delta lnaexport_t = & \alpha_{30} + \sum_{p=1}^k \alpha_{31p} \Delta lnaexport_{t-p} + \sum_{p=1}^k \alpha_{32p} \Delta lnagdpt_{t-p} + \sum_{p=1}^k \alpha_{33p} \Delta lewf_{t-p} \\ & + \sum_{p=1}^k \alpha_{34p} \Delta lnatotal_{t-p} + \sum_{p=1}^k \alpha_{35p} \Delta lFDI_{t-p} + \sum_{p=1}^k \alpha_{36p} \Delta ltro_{t-p} \\ & + \sum_{p=1}^k \alpha_{37p} \Delta lexc_{t-p} + \phi_3 E_{t-1} + \varepsilon_{3t} \end{aligned} \tag{5}$$

$$\begin{aligned} \Delta \ln total_t = & \alpha_{40} + \sum_{p=1}^k \phi_{41p} \Delta \ln total_{t-p} + \sum_{p=1}^k \alpha_{42p} \Delta \ln agdp_{i,t-p} + \sum_{p=1}^k \alpha_{43p} \Delta \ln aexport_{t-p} \\ & + \sum_{p=1}^k \alpha_{44p} \Delta \ln lewf_{t-p} + \sum_{p=1}^k \alpha_{45ip} \Delta \ln FDI_{i,t-p} + \sum_{p=1}^k \alpha_{46p} \Delta \ln tro_{t-p} \\ & + \sum_{p=1}^k \alpha_{47p} \Delta \ln exc_{t-p} + \phi_4 ECT_{t-1} + \varepsilon_{4t} \end{aligned} \tag{6}$$

$$\begin{aligned} \Delta FDI_t = \alpha_{50} & + \sum_{p=1}^k \alpha_{51p} \Delta FDI_{t-p} + \sum_{p=1}^k \alpha_{52p} \Delta \ln agdp_{t-p} + \sum_{p=1}^k \alpha_{53p} \Delta \ln aexport_{t-p} \\ & + \sum_{p=1}^k \alpha_{54p} \Delta \ln total_{t-p} + \sum_{p=1}^k \alpha_{55p} \Delta \ln lewf_{t-p} + \sum_{p=1}^k \alpha_{56p} \Delta \ln tro_{t-p} \\ & + \sum_{p=1}^k \alpha_{57p} \Delta \ln exc_{t-p} + \phi_5 ECT_{t-1} + \varepsilon_{5t} \end{aligned} \tag{7}$$

$$\begin{aligned} \Delta \ln tro_t = \alpha_{60} & + \sum_{p=1}^k \alpha_{61p} \Delta \ln tro_{t-p} + \sum_{p=1}^k \alpha_{62p} \Delta \ln agdp_{t-p} + \sum_{p=1}^k \alpha_{63p} \Delta \ln aexport_{t-p} \\ & + \sum_{p=1}^k \alpha_{64p} \Delta \ln total_{t-p} + \sum_{p=1}^k \alpha_{65p} \Delta FDI_{t-p} + \sum_{p=1}^k \alpha_{66p} \Delta \ln lewf_{t-p} \\ & + \sum_{p=1}^k \alpha_{67p} \Delta \ln exc_{t-p} + \phi_6 ECT_{t-1} + \varepsilon_{6t} \end{aligned} \tag{8}$$

$$\begin{aligned} \Delta \ln exc_t = \alpha_{70} & + \sum_{p=1}^k \alpha_{71p} \Delta \ln exc_{t-p} + \sum_{p=1}^k \alpha_{72p} \Delta \ln agdp_{t-p} + \sum_{p=1}^k \alpha_{73p} \Delta \ln aexport_{t-p} \\ & + \sum_{p=1}^k \alpha_{74p} \Delta \ln total_{t-p} + \sum_{p=1}^k \alpha_{75p} \Delta FDI_{t-p} + \sum_{p=1}^k \alpha_{76p} \Delta \ln tro_{t-p} \\ & + \sum_{p=1}^k \alpha_{77p} \Delta \ln lewf_{t-p} + \phi_7 ECT_{t-1} + \varepsilon_{7t} \end{aligned} \tag{9}$$

In Equations (2)–(9), Δ is the difference operator; ϕ is the short-run dynamic coefficients to be estimated and is the serially uncorrelated error term $\varepsilon_{i,t}$; k is the optimal lag length reduced by 1; α is the speed of the correction parameter with a negative sign; and ECT_{t-1} is the error correction term, which is the lagged value of the residuals obtained from the cointegration regressions of the dependent variable on the regressors. Thus, the past disequilibrium term (i.e., ECT) determines if the long-run causality holds.

6. Results

This section presents the empirical results on the connectivity between natural resources’ management, FDI, and economic welfare. It begins with an initial preliminary check and ends with a discussion of findings.

6.1. Preliminary Checks

Table 1 display the summary statistics of the data used. It attempts to provide details on the behaviour of the series before any analysis is carried out. The average and corresponding long-term mean of economic welfare stood at 1825 (51.1). Similarly, natural resources driven by GDP is 86.16 (33.58), natural resources to export are 11.85 (0.57), and FDI is 0.97 (0.36), respectively.

Table 1. Summary statistics.

Variables	Mean	Std. Dev.	Obs
ewf	1825	51.1	38
nagdp	86.16	33.58	38
naexport	11.85	0.57	38
natotal	0.36	0.02	38
FDI	0.97	0.36	38
tro	0.75	0.04	38
exc	0.015	0.002	38

Note. Economic welfare (ewef), natural resource contribution (%GDP), natural resource to export (nat export), total national resource (natotal), trade (%GDP) (tro), real exchange rate (exc).

6.2. Unit Root Test—Modified Efficient PP Test

This section aims to conduct unit roots tests on the series used for the analysis. This is important to have information on the stochastic properties of the variables used. The precise unit test conducted follows the Ng and Perron (2001) modified statistic procedure. Three reasons motivate our use of the Ng Perron unit root test. The Ng and Perron primary properties are summarised in M_t and decomposed into three tests: MZ_α , MZ_t , and MSB , statistically expressed in Equations (10) and (11):

$$MZ_\alpha = \left[\left(T^{-1}y^2_T - s^2_{AR} \right) \left(2T^{-2} \sum_{t=1}^T y^2_{t-1} \right)^{-1} \right], \tag{10}$$

$$MSB = \left| \left(T^{-1} \sum_{t=1}^T y^2_{t-1} / s^2_{AR} \right) \right| \tag{11}$$

MZ_α , MZ_t , and MSB are assumed to be an autoregressive estimate of the spectral density at frequency zero (see Ng and Perron 2001; Perron and Ng 1996). The M test for $p = 0$ and 1 are taken from the least-squares obtained. The results of the Ng Perron unit root test conducted are reported in Table 2.

Table 2. NG Perron unit root tests.

Variables	M_α	MZ_t	MSB	MPT
Level				
ewf	1.33898	0.96977	0.72427	42.0692
nagdp	−3.14978	−0.95999	0.30478	7.37479
naexport	−3.48683	−1.31790	0.37796	7.02560
natotal	−0.73262	−0.39994	0.54591	18.4265
FDI	−1.5906	−2.73658	0.17553	6.16880
tro	−5.32248	−2.13291	0.22879	272837
exc	−1.79961	−0.94623	0.52580	13.5804
First Difference				
Δewf	−16.6052 **	−2.87546	0.17317	1.49748
Δnagdp	−9.94932 **	−2.08835	0.20990	2.99738
Δnaexport	−6.22189 **	−1.62495	0.26177	4.37141
Δnatotal	−15.3025 **	−2.75571	0.18008	6.01582
ΔFDI	−18.6885 **	−2.96797	0.15881	5.40432
Δtro	−15.4669 **	−2.778836	0.17963	1.59357
Δexc	−16.1275 **	−2.79524	0.17332	5.91221
Critical Value				
1%	−13.8000			
5%	−8.1000			

Notes. Economic welfare (ewef), natural resource contribution (%GDP), natural resource to export (natexport), total national resource (natotal), trade (%GDP) (tro), real exchange rate (exc). The signs ** $p < 0.05$, represent the statistical significance levels at 1%, 5%, and 10%, respectively.

Based on the unit root test, not all the variables were stationary at the level, indicating that no constant mean, variance, and autocovariance is exhibited by the series. To circumvent the problem, we transformed the data by taking their first differences and all the series were stationary.

By implication, differencing the series implies that the long-term potential needs to be re-examined, which cannot be achieved without knowing the optimum lag length. To determine the lag length, we used the Akaike (AIC), Hannan–Quinn (HQ), and Schwarz information criteria (SC), and the results are reported in Table 3.

Table 3. Var lag length selection criteria.

Lag	Lag Tests					
	Lolo	LR	FPE	AIC	SC	HQ
0	95.94877	NA	1.26e-11	−5.232280	−4.918030	−5.125112
1	366.7270	414.1314	2.90e-17	−18.27806	−15.76405 *	−17.42071
2	436.4031	77.87333 *	1.27e-17 *	−19.49430 *	−14.78054	−17.88677 *

Notes. * Indicates lag order selected by the criterion. LR: sequentially modified LR test statistic (each test is at the 5% level), FPE: final prediction error, HQ: Hannan–Quinn information criterion, AIC: Akaike information criterion, SC: Schwarz information criterion.

The statistical criteria unanimously select lag 2 as the optimal lag length leading to the cointegration tests implemented, and the results are summarised in Table 4.

Table 4. Results for Johansen cointegration tests.

Null Hypotheses	Eigenvalue	Trace Test		Max. Eigen Value Test	
		Statistics	95% Critical Value	Statistics	95% Critical Value
$r = 0$	0.97	370.33 *	95.75	126.0 *	49.58
$r \leq 1$	0.94	244.23 *	65.81	95.8 *	43.41
$r \leq 2$	0.85	148.43 *	47.84	64.5 *	37.16
$r \leq 3$	0.66	83.91	95.2	35.9	40.81

Notes. * Indicates significance and cointegration.

The emerging results indicate that we reject the null hypothesis of no cointegration for $r = 0$ for trace statistics and maximum Eigenvalues statistics. The trace value was greater than their 95% critical value for their null hypothesis, with a 5% significance level. This result suggests that three cointegrating equations exist among the series.

6.3. Granger Causality Tests

Following the pre-test, we implemented the Granger causality suggested and developed by Granger (1969). Precisely, we used VAR/VEC Granger causality, justified on two grounds. First, the series were stationary at the first differences; second, the variables were cointegrated. Table 5 summaries the results of the VAR/VEC Granger causality tests.

The results of the VAR/VEC Granger causality tests can be summarised in four-folds. First, there is a short- and long-run relationship among the variables. Second, the natural resource to GDP, FDI, and exchange rate unidirectionally Granger cause economic welfare, whereas bidirectional Granger causality is observed between national resources and export, trade, and economic welfare. Third, total natural resource unidirectionally Granger causes FDI, whereas national resource to export unidirectionally Granger causes trade openness. Fourth, the vector error correction model indicating the speed of convergence of the variables to the long-term mean was negative and statistically significant for most variables, except trade openness and exchange rate.

Table 5. Summary results of the granger causality tests.

Independent	Short: Direction of Causality							Long Run
	Dependent Variables							
	Δewf_t	$\Delta nagdp_t$	$\Delta naexport_t$	$\Delta natotal_t$	Δfdi_t	Δtro_t	Δexc_t	$\Delta Vecm_{t-1}$
Δewf_{t-i}	-	3.13 [0.92]	5.61 ** [0.00]	2.70 [0.57]	1.24 [0.85]	18 ** [0.00]	1.24 [0.69]	-0.02 ** [0.00]
$\Delta nagdp_{t-i}$	10.6 ** [0.00]	-	5.9 ** [0.00]	5.8 * [0.00]	3.89 [0.28]	0.53 [0.90]	0.69 [0.84]	-0.08 ** [0.00]
$\Delta naexport_{t-i}$	21.5 ** [0.00]	2.15 [1.45]	-	7.1 ** [0.00]	2.27 [0.58]	5.90 ** [0.00]	2.97 [0.64]	0.001 * [0.00]
$\Delta natotal_{t-i}$	6.69 * [0.01]	4.08 ** [0.00]	9.58 ** [0.00]	-	8.45 ** [0.00]	1.95 [0.45]	2.23 [0.59]	-0.04 * [0.00]
Δfdi_{t-i}	11.04 * [0.00]	5.12 ** [0.00]	3.16 [0.63]	12.3 ** [0.00]	-	8.42 ** [0.00]	4.85 * [0.00]	0.09 * [0.00]
Δtro_{t-i}	9.10 ** [0.00]	1.66 [0.16]	6.79 ** [0.00]	1.25 [0.84]	1.22 [0.94]	-	0.53 [0.61]	0.001 [0.27]
Δexc_{t-i}	14.5 ** [0.00]	2.5 [0.38]	4.65 * [0.371]	1.56 [0.66]	2.33 [0.87]	1.41 [0.72]	-	-0.02 ** [0.00]

Notes. Economic welfare (ewef), natural resource contribution (%GDP), natural resource to export (nat export), total national resource (natotal), trade (%GDP) (tro), real exchange rate (exc). The signs ** $p < 0.05$, and * $p < 0.1$ denote p -values and the statistical significance levels at 1%, 5%, and 10% respectively.

In Table 6, we present the long-run implication for economic welfare. The results suggest a positive and statistically significant relationship between economic welfare, natural resource to GDP, natural resource to export, total natural resources, and FDI, except exchange rate, which is negative, and trade openness, which is positive, but not statistically significant. The coefficient of the natural resources to GDP is about 0.25. This indicates that a 1% increase in the natural resource to GDP will raise economic welfare by 25%. Similarly, the coefficient of natural resource to export is 0.003 and is statistically significant at the 10% level, indicating a 1% increase in natural resource to export will raise economic welfare by 3%. For FDI, the coefficient is 0.007 and statistically significant at about 0.007, indicating that a 1% increase in FDI will raise economic welfare by 7%.

Table 6. Long-run results. Dependent variable—economic welfare.

Variables	Coefficient	Std. Error.
constant	-1.51 *	0.04
Innagdp _t	0.25 **	0.06
Innaexport _t	0.034 *	0.00
Innatotal _t	1.42	6.78
Infdi _t	0.007 **	0.00
Intro _t	1.52	9.73
Inexc _t	-0.03 *	0.00
R-squared	0.91	
Adj R-squared	0.89	
S.E. of regression	0.013	
Akaike info criterion	-6.96	
Schwarz criterion	-7.64	
F-statistics	134.6	
Dublin–Watson	1.78	
Diagnostic tests	Statistics	p -value
J–B normality test	0.813	0.7757
Breusch–Godfrey LM test	1.981	0.5668
ARCH LM test	1.567	0.6803
White heteroscedasticity	2.989	0.2404
Ramsey RESET	1.549	0.3722

Notes. Economic welfare (ewef), natural resource (%GDP), natural resource to export (nat export), total national resource (natotal), trade (%GDP) (tro), real exchange rate (exc). The signs ** $p < 0.05$, and * $p < 0.1$ indicate the statistical significance levels at 1%, 5%, and 10%, respectively.

The short-run implications for economic welfare are reported in Table 7. The emerging results indicate a positive and statistically significant relationship exists between economic welfare, natural resource to GDP, natural resource to export, total natural resources, and trade openness, except for exchange rate, which was negative and not statistically significant. As expected, the error correction term (ect) coefficient indicates the speed of convergence of the variables to their equilibrium position was found to be negative and statistically significant, indicating that the variables revert to their long-term mean with a velocity of about 5%. We also implemented several diagnostic tests to ascertain the robustness of the results, including the Breusch–Godfrey LM test for autocorrelation of any order in residual, autoregressive conditional heteroscedasticity (ARCH) for checking the volatility of the series, and the serial correlation test. The test shows the error is independently and identically distributed (iid), normal, and homoscedastic. Consistently, the Ramsey reset shows that the model is robust and well specified.

Table 7. Short-run results. Dependent variable—economic welfare.

Variables	Coefficient	Std. Error.
constant	−0.338 **	0.15
$\Delta \ln \text{ngdp}_t$	0.104 **	0.03
$\Delta \ln \text{naexport}_t$	0.481 ***	0.16
$\Delta \ln \text{natotal}_t$	−2.37	5.20
$\Delta \ln \text{fdi}_t$	0.873 **	0.24
$\Delta \ln \text{tro}_t$	0.901 *	0.54
$\Delta \ln \text{exc}_t$	−0.337	0.29
ECT_{t-1}	−0.005 **	0.00
R-squared	0.77	
Adj R-squared	0.73	
S.E. of regression	0.008	
Akaike info criterion	−5.54	
Schwarz criterion	−6.81	
F-statistics	134.6	
Dublin–Watson	1.78	
Diagnostic tests	Statistics	p-value
J-B normality test	0.7888	0.6740
Breusch–Godfrey LM test	1.713	0.1993
ARCH LM test	1.0157	0.9186
White heteroscedasticity	1.0234	0.5248
Ramsey RESET	1.9260	0.7251

Notes. Economic welfare (ewef), natural resource to GDP (%GDP), natural resource to export (nat export), total national resource, (natotal), trade (%GDP) (tro), real exchange rate (exc). The signs *** $p < 0.001$, ** $p < 0.05$, and * $p < 0.1$ indicate the statistical significance levels at 1%, 5%, and 10% respectively.

We also check the presence of structural breaks in the data set between 1989 and 2010 using the Chow test, reported in Table 8. Our Chow stability test indicates no evidence of structural breaks in the dataset.

Table 8. Statistical output for the stability test (chow forecast test).

Forecast Period	F-Statistics	p-Value of F-Statistics	Log-Likelihood Ratio	p-Value of Log of Likelihood
1989–2010	1.258	0.619	56.18	0.895

7. Conclusions

Nigeria can develop a stable economy with its vast reserves of human and natural resources, in order to provide health, education, and infrastructure services. It is rather unbelievable that the incredible resources gained from oil have not yet been reflected in Nigeria’s rate and level of growth. This study investigated whether FDI supported the resource curse hypothesis in Nigeria. The annual series dataset obtained from the Central

Bank of Nigeria from 1980 to 2019 was used. The precise methodological contribution was based on the VAR/VEC Granger causality test. The finding showed cointegration among the variables, whereas the speed of adjustment was slightly low. Similarly, natural resource to GDP, FDI, and exchange rate unidirectionally Granger cause economic welfare, whereas bidirectional Granger causality is observed between indicators of natural resources to export, trade, and economic welfare.

There are several policy implications that can be deduced from the findings. First, the failure of the Nigerian economy to attract foreign direct investment and effectively utilise the unexpected wealth to promote economic welfare has slowed growth and results in a poor standard of living. Second, Nigeria is blessed with a greater accumulated wealth of resources and is the sixth-largest oil exporter in the world with a hold the tenth-largest proven oil reserve in the world. However, the country still has a lower level of human development owing to its weak institutions and poor educational systems. Third, a confluence of social, political, and economic dynamics appears to be at play, diverting money from the poor to a select group of rich individuals and preventing FDI. Fourth, the systemic problem of inflating business cost and misdirecting aid for personal gain has undermined equitable national development. Some of the FDI that comes into Nigeria seems to be falling into an economic trap that causes spiralling inflation, the shrinking of the real sector, and the depletion of foreign exchange resources. Finally, Nigeria's resource curse may or may not be a mixed blessing, but lessons learned from other countries, such as Norway, show that a well-managed economy may turn a curse into a blessing.

The study recommends the following. Firstly, there is an urgent need for effective and efficient management of the country's natural resources to attract and generate growth that can contribute meaningfully to the welfare of the citizens. Secondly, there is a need to diversify oil resources to other non-natural resources for the economy to stimulate growth and reduce the vulnerability of the economy to external shocks.

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Appendix A

Table A1. Description of variables.

Variables	Measurement	Sources	Symbols
Economic welfare	Our welfare variable is computed by combing the real domestic absorption, capital stock, and real total factor productivity (TFP)	Penn World Table (PWT 9.1)	ewf
Natural resources			
Natural resources driven by GDP	Natural resources to GDP (oil rent, mineral rent, and forest rent) (see, Asiedu 2013 ; Bokpin et al. 2015)	Central Bank of Nigeria (CBN)	nagdp
Natural resources driven by export	Natural resource to export (fuel export (FE) and mineral export).	Central Bank of Nigeria (CBN)	naexport
Total natural resources	Total natural resource rent computed as the sum of oil rent (%GDP), natural gas, coal rents, regional rental ratem and average price (Bokpin et al. 2015 ; Ndikumana and Sarr 2019)	Central Bank of Nigeria (CBN)	natotal
FDI	Net inward FDI inflows (% GDP) (Ndikumana and Sarr 2019)	UNCTAD stat	FDI
Trade openness	It is measured as trade (% GDP)	World Bank (WDI)	tro
Real exchange rate	It is a measure of the value of a currency against weighted average of several foreign currencies by divided by price deflator.	World Bank (WDI)	exc

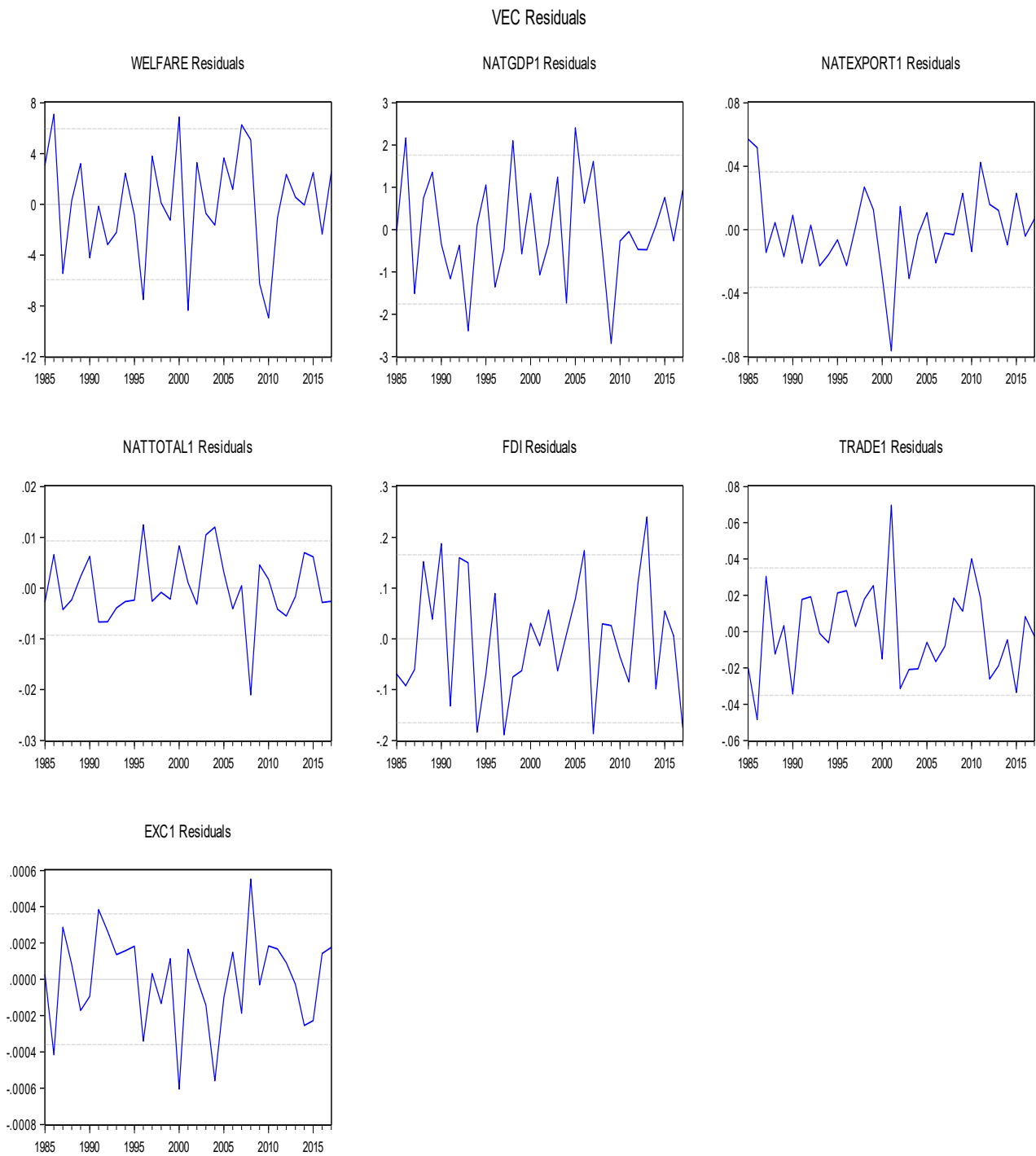


Figure A1. Vector Error Correction Residuals.

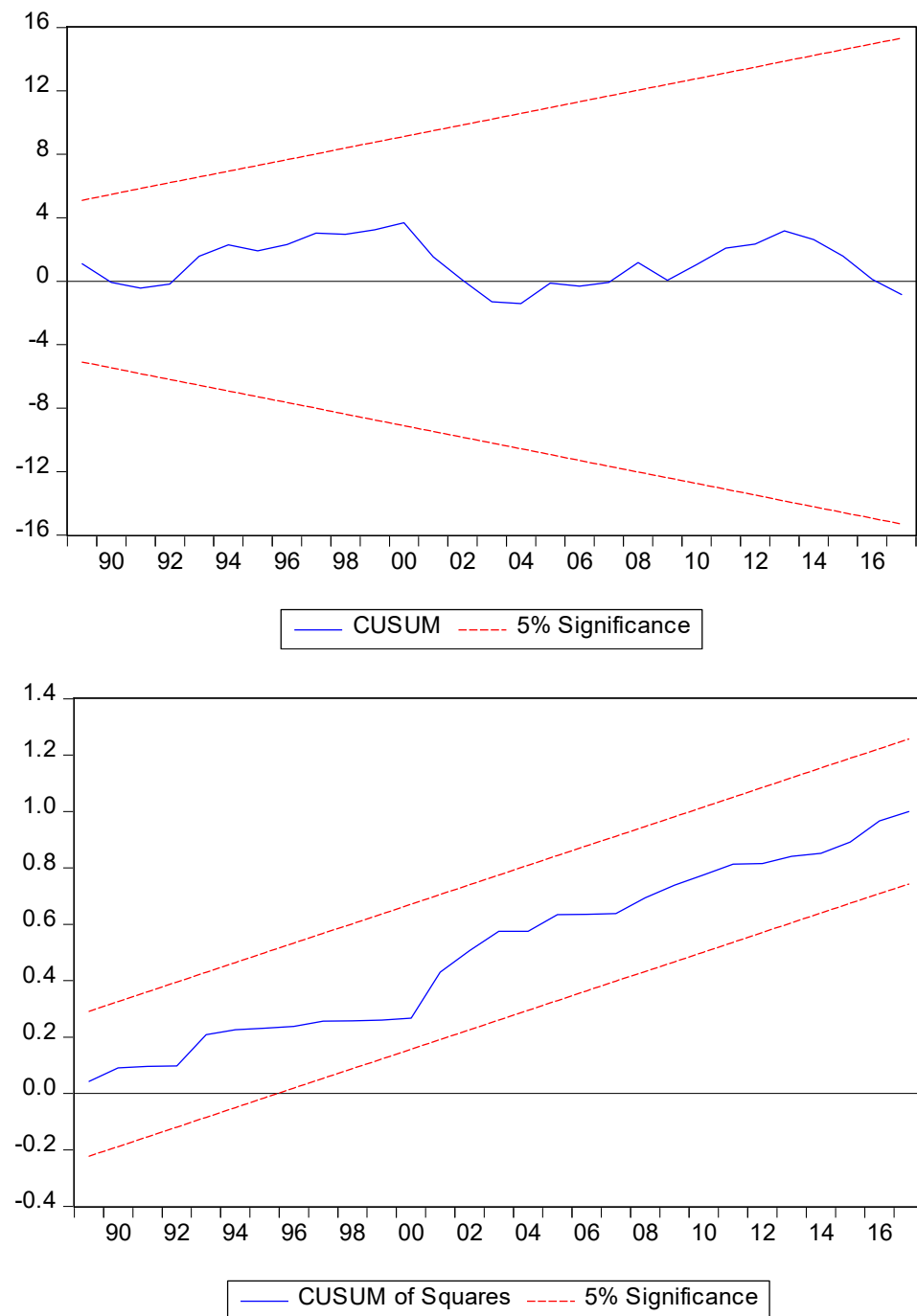


Figure A2. CUSUM of Squares at 5%.

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