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The Export-Led Growth Hypothesis and the Resource-Curse Scenario in 14 Oil-Producing SSA Countries: Evidence from Panel Decomposition Approach

[1*]Dada, M. A. [1]Posu, S. M. A. [1]Adedeji, A. O. [2]Okungbowa, O. G. [3]Oguntegbe, A. A.

[1]Department of Economics, College of Management Sciences, Federal University of Agriculture, Abeokuta, Nigeria.
[2]National Institute for Legislative and Democratic Studies, National Assembly, FCT, Abuja, Nigeria
[3]Department of Business Administration, The Polytechnic Ibadan, Oyo State, Nigeria.
[*]Corresponding Author: mattabeyvoice2@yahoo.com

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Abstract

International trade theorists provide some mechanisms through which trade could be used as a driver of economic growth but nations of the world show different dispositions to these causing variations in economic growth. This study examines the role of international trade in the growth process by finding out the validity of export-led growth hypothesis (ELGH) and the existence of resource-curse scenario (RCS) in 14 oil-producing Sub-Saharan African countries following panel econometric procedure. Specifically, the study employed ANOVA and Levene F-test to test for equality of means and variances across sample. First generation panel unit root, as well as Pedroni and Kao cointegration tests were conducted to account for stationarity of each series and long run equilibrium relation among the group of variables. The panel regression model was estimated using fixed and random effect model with Hausman test used to determine the choice of appropriate model for adoption. Panel ARDL was used to account for the short run dynamics in the model of export and economic growth nexus. Pairwise Dumitrescu Hurlin Causality (PDHC) test was used to account for causality. In all, the result invalidates the export-led growth hypothesis but confirmed the existence of resource-curse scenario. While an expansive oil export trade caused a significant contraction in economic growth, an expansive non-oil export trade caused a significant expansion in economic growth in the long run. Inflation and exchange rate were found to have produced negative effect on growth both in the short run and long run. Oil export significantly caused deterioration in economic growth of these countries evidencing a resource-curse scenario. The policy implication of this finding is that both export promotion and output enhancement policies should be rigorously pursued with emphasis on the non-oil sector to boost non-oil export trade for rapid economic progress in the affected countries.

Keywords: Trade Theorists, Export-led growth, Oil export, Non-oil export, Oil-producing Sub-Saharan African Country

JEL Classification Codes: B22; E23; F43; O47; R11

1.0 Introduction

Trade theorists argued that countries that engage in trade are likely to grow faster than those that fail to do so (Shahbaz,2012; and Nasrin and Koli, 2018). This view anchored on a popular slogan "Trade, not Aid, in Less Developed Countries". However, the proponents of this view are not specific about which type of trade really matters for economic growth. Trade can be classified into domestic and foreign trade. Domestic trade is categorized into wholesale, retail, and petty trade while foreign trade is classified into import and export trade. Foreign trade can further be categorized into oil trade and non-oil trade. The import trade, therefore, can be classified into oil and non-oil import while the export trade can equally be classified into oil and non-oil export trade. The focus of this study is on trade involving countries of the world, which is known as foreign trade, external trade, or international trade but with particular interest in export trade category, which is further split into two: oil export trade and non-oil export trade.

Although many studies on trade-economic growth nexus have considered both import and export trade together in their determination of trade impact on economic growth, this approach does not give room to countries who really share optimism in using one line of trade to drive their economies (Mohan and Nandwa, 2007; Shihab, Soufan, and Abdul-Khaliq, 2014; and Abosedra and Tang, 2019). Countries vary in their trade ideology. Some countries have optimism in using export trade as growth strategy while maintaining zero tolerance for import trade because of their pessimistic view that import trade is inimical to economic growth (Dada, 2019). This ideology originated from the Mercantilist school of thought, which gained prominent in Western Europe between 1500 and 1800. This school of thought vigorously campaigned in favour of trade but strongly encouraged export trade while discouraging import trade. What is ideal according to this doctrine is export promotion in conjunction with import restriction. The motivation for this ideology is that export trade serves as a source of foreign exchange earnings to a country, while import trade serves as a source of leakages, draining the nation of foreign exchange reserves, and thus negatively affects the balance of payment position of a country. This made the doctrine of Mercantilism to favour export promotion with import restriction as a good strategy for economic growth.

Many developing countries in the recent time are trying to key in into this growth strategy by providing support for production of intermediate and final products for international market. Part of these support include subsidizing industries whose mandate is to produce for export, given tax concession as well as lowering taxes to make prices more competitive in the international market. Some countries have continued to devalue their currencies to ensure product prices are relatively cheaper at the international market (Chakrabarty and Chakravarty, 2012; Ngumi, 2013; and Bal, Mamun, Basher, Uddin and Mowla, 2019). Countries stand to gain from export-boost strategy through increased foreign reserves, healthy and sustainable balance of payment position (Darat, 1986; Konya, 2006). Importation is only considered necessary to the extent that it complemented export growth such as importation of inputs that support domestic production as well as technology needed to reduce production cost with improved efficiency and productivity.

This study hangs on the theory prediction that trade will positively impact growth by examining the export trade-growth nexus in 14 oil-rich Sub-Saharan African (SSA) countries using available data from 1980 to 2018. This theory prediction implies that export growth occurs prior to economic growth, meaning that export trade sector must be expanded first for a nation to achieve economic growth. The necessary condition is that the sign of coefficients of export trade variables is expected to be positive and significant while the sufficient condition is that the direction of causality is ideally expected to run from export trade variables to economic growth. Put differently, export must Granger cause economic growth. Meeting these two conditions are required to validate the export-led growth hypothesis (ELGH). The sign of the co-efficient of oil-export is expected to be positive and significant to rule out the existence of resource-curse scenarios in these countries.

While several country-specific, regional, and multi-country studies have been conducted on this topic over the years, there is no consensus as regards the outcomes of this debate (Kalaitzi and Tang, Lai and Uzturk, 2015; Bosupeng, 2015; Cleeve, 2018; Fapetu and Owoeye, 2018). There have been mixed findings across studies and time on the validity of ELGH. A number of the studies have confirmed the validity of ELGH in some countries or regions but not in some other countries/regions. Instead of unidirectional causality running from export to economic growth to validate ELGH or a unidirectional causality running from economic growth to export to invalidating the hypothesis, there have been studies reporting a bi-directional causality between exports and economic growth with others reporting no causal evidence in any direction between the two variables. This observation left the debate inconclusive and subject to further investigation. Asides, the use of decomposition approach to narrow down this hypothesis to some specific export components might produce some headway especially in the case of the 14 oil-producing SSA countries, which are the focus of this study. The ELGH has been found for 30 African countries by Biyase and Zwane (2014). Earlier studies such as Chenery (1979), Ram (1985), Fosu (1990), Salvatore and Hatcher (1991), among others, have equally found support for this hypothesis. Although several studies have been conducted on this important topic. Vital studies on ELGH include Jung and Marshal (1985), Darat (1986), Dodaro (1993), Sharma and Dhakal (1994), Riezman, Summers, and Whiteman (1996), Shirazi and Manap (2004), Mohan and Nandwa (2007), He and Zhang (2010), and Limael, Heybatian, Vaezin and Turkman (2011). The more recent studies include Sheridan (2014), Biyase and Zwane (2014), Tang, Lai and Uzturk (2015), Bosupeng (2015), Shafiullah, Selvanathan, and Naranpanawa, (2017), Nasrin and Koli (2018), Kalaitzi and Cleeve (2018), Aslan and Topcu (2018), and Bal, et al, (2019).

This study differs from prior studies firstly by decomposing the export trade into two components namely: oil export trade and non-oil export trade. Secondly by including variables such as inflation, and exchange rate as control in the models. Thirdly, by testing for resource-curse scenario in these oil-based economies. The data coverage is from 1980 to 2018. The outcome of this study would shed light on which way to go, should it be oil export-led growth or non-oil export-led growth or otherwise in these countries. The selected countries are oil-rich nations situated in the SSA region. They are confronted with many social-economic challenges.

They are characterized with instability and uncertainty but are struggling hard to overcome many of these problems especially in the recent time. The revenue earnings from oil export for many years have not translated into any meaningful development. The oil sector itself is not developed talk less of the non-oil sector despite the many years of oil revenue earnings. If the oil-wealth is managed effectively, many modular refineries should have been built across the region and petroleum products for instance, should have been relatively cheaper in the region compare with the rest of the world. In an attempt to derive some policy direction for these economies, this study tests the validity of export-led growth hypothesis and the existence of resource-curse scenario in 14 oil-producing SSA countries using panel econometrics techniques.

The remaining part of this study is thus given as follows: After this introductory section is, Section 2 that presents a brief review of literature on this novel topic. Following this is Section 3 where the data and estimation procedures are presented. Next to this is Section 4, which presents the empirical results while Section 5 gives the conclusion.

2.0 Literature Review

The adventure into an export driven economic growth could be traced to the early time, during the heyday of Mercantilism, an economic doctrine that gained prominence in Western Europe between the 15th and 18th centuries. The doctrine absolutely canvassed for trade as the only source of wealth of nations. Trade under this arrangement was in favour of export as against import. Export promotion and import restriction have been proposed as a major strategy through which nations of the world can achieve economic prosperity. The evolution of Mercantilism has put a search light on the role of external sector in economic growth and development. International economists have since then been put under high alert to unfold the benefits attached to mutual trade agreements between and across countries of the world. Other schools of thought have emerged particularly the Structuralist and Post Keynesian economists. These schools of thought have also analyzed foreign trade-economic growth nexus using the perspective of export-led growth, import substitution strategy, and balance of payments constraints. Post Keynesian economists, inspired by Harrod, Domar, and Kaldor, exhibits the vital role of saving and external shocks in determining long run economic growth. The Structuralists, on the basis of demand-pull features of an economy, emphasize the importance of current account deficits and financial aspects in capital account. Extant literature on developing countries has isolated two major challenges to development, namely saving gap and external gap. Saving gap is met through borrowing and foreign aid. See, Chenery and Bruno (1962), Taylor (1993), Findlay (1984), and Thirlwall (1979).

Kaldor (1970) developed an export-led growth model built on the notion of cumulative causation, taking into consideration the fact that exports are the main components of demand. This model expressed output as a function of export. On this basis, the output growth is defined as

$$y = \phi \boldsymbol{e}^{\boldsymbol{x}} \tag{1}$$

Where y is the growth rate of output, $\boldsymbol{e^x}$ is the growth rate of exports, and ϕ is the elasticity of output growth with respect to export growth.

A number of studies have been conducted on ELGH across economies and regions. For instance, Konya (2006) conducted a Granger causality between exports and gross domestic product (GDP) in 24 OECD countries using both bivariate (GDP and export) and trivariate (GDP, export, and openness) with a linear time trend. The results showed that there was one-way causality from export to GDP in Belgium, Denmark, Iceland, Ireland, Italy, Spain and Sweden, supporting the ELGH in these countries. The result also found one-way causality running from GDP to exports for Austria, France, Greece, Japan, Mexico, Norway, and Portugal, invalidating the ELGH. Also, a two-way causality between exports and economic growth was found for Canada, the Netherlands, and Finland, confirming both ELGH and growth-led export hypothesis (GLEH) in these countries. The two-way causation here is not in line with ELGH because it requires a one-way causality running from export trade to economic growth and export trade must equally have a positive and significant coefficient. So, ELGH cannot be said to be valid under a bidirectional causality. Part of the result also showed evidence of no causality in any direction for Australia, Korea, Switzerland, Britain, America, and Luxembourg, invalidating any of these hypotheses for these countries.

Limael, Heybatian, Vaezin, and Turkman (2011) conducted a study on Iranian economy using wood imports and exports and their relationships with a number of macroeconomic variables. The study found notable relationships between wood export and economic growth in Iran. Biyase and Zwane (2014) examined ELGH in 30 African countries using panel econometric approach. The result validated the ELGH in the 30 African countries.

The literature has produced a mixed evidence in relation to validity of ELGH. It implies that the growth strategy of ELGH may work in some economies but may not work in some others. The simple fact here is that ELGH cannot be generalized as a working growth strategy in all countries or regions. As good as this growth strategy appears, it has its own challenges. For instance, He and Zhang (2010) noted that after 30 years of economic transformation, China has emerged as one major economy to date with a robust global trading relation. The author cautioned on the danger of making Chinese economy becoming too much export-dependent. The status would make the economy vulnerable to business cycle fluctuations. Nations adopting the growth strategy should take the warning so seriously as external shocks that may pose a great setback. Shocks do arise when least expected. Alternative course of actions must be put in place to make the economy invulnerable to any shocks of this nature. These type of shocks affected some countries involved in this study. Nigeria is a country that relies heavily on oil export as earner of foreign exchange. The external shocks account for the acclaimed recession the Nigerian economy between 2016 and 2018, which worsened in the year 2020 due to the outbreak of a global pandemic popularly called COVID-19, which caused great economic shock to the global community. On this note, He and Zhang (2010) advised China to start undergoing a switch over to a domestic-demand-led growth strategy. It is necessary to boost domestic market to accommodate more of locally made goods than to rely too heavily on foreign market. Achieving endogenous consumption is much more sustainable to economic growth of many economies especially in the third world countries.

In order to isolate the contribution of non-oil from total foreign trade impact on economic growth in Nigeria, Dada (2019) conducted a study on disaggregated analysis of foreign trade impact on economic growth reflecting on Nigeria experience between 1981 and 2017 using dummy variable to capture the recession period. The result showed that non-oil trade has positive impact on economic growth while oil trade has negative impact, which declined marginally during recession due to some measures taken by the government to contain the recession. A few of the studies that engaged in disaggregated approach are mostly country-specific. Other studies, along the same line have not provided precise and specific information on the existence of resource curse phenomenon in line with empirical evidence in these countries

This study contributes to this growing debate by concentrating on 14 oil-rich SSA countries; decomposes export trade into oil export trade and non-oil export trade; and incorporates exchange rate and inflation rate variables that affect consumption both at foreign and domestic markets. It also widens the scope of investigation by simultaneously including the subject of resource-curse. This study therefore tests the validity of ELGH and the existence of resource-curse scenarios in 14 selected countries of interest. The study sheds light on which export should drive growth in these countries. Should it be oil export-driven growth or non-oil export-driven growth? It similarly serves as a source of evidence for or against the general view of resource-curse scenarios in these oil-producing SSA countries.

This study therefore employed panel econometric techniques to test for the validity of export-led growth hypothesis as well as the existence of resource course scenario in the 14 oil- producing SSA countries.

3.0 Data and Econometric Methodology

This study tests the validity of export-led growth hypothesis as well as existence of resource-curse syndrome in 14 oil-rich Sub-Saharan African countries using panel econometric procedures amidst decomposed oil and non-oil export trade. Panel data covering 1980–2018 were sourced on GDP, population, oil export, non-oil export, exchange rate, and inflation rate. Data were collected using multiple sources such as World Development Indicators (WDIs), International Monetary Funds (IMF), and database of the apex bank of each country.

The choice of the period is informed by the availability of data on all the variables involved in the study since the study is based on balanced panel approach. The inclusion of a country in the sample depends on the availability of data on all the underlying variables for the period of 1980–2018. The countries involved in the study are oil-rich and are based in the SSA region. These countries are relatively rich in oil endowment but their economies are characterised with many social ills and misfortunes despite the oil wealth. The SSA countries lag behind among the comity of nations across the globe. The standard of living has been very poor due to low income per capita and growing inequality despite the oil wealth in these countries. It becomes necessary to test whether the export trade sub-sector is desirable as a driver of economic growth in these countries.

3.1 Model Specification

The model begins with the intensive form of the production function, which is given by

$$\boldsymbol{y} = \boldsymbol{f}(\boldsymbol{k}^{\boldsymbol{\alpha}}) \tag{2}$$

By incorporating the foreign trade variable, Equation (2) becomes

$$\boldsymbol{y} = \boldsymbol{f}\left(\boldsymbol{k}^{\boldsymbol{\alpha}},\ \boldsymbol{t}^{\boldsymbol{\beta}}\right) \tag{3}$$

Where $\boldsymbol{y}$ stands economic growth, $\boldsymbol{k}$ represents capital per effective labour, $\boldsymbol{t}$ is foreign trade, while $\boldsymbol{\alpha}$ **and** $\boldsymbol{\beta}$ are the contributions of k and t to $\boldsymbol{y}$

By placing restriction on coefficient of k**,** Equation (3) becomes

$$\boldsymbol{y} = \boldsymbol{f}\left(\boldsymbol{t}^{\boldsymbol{\beta}}\right) \tag{4}$$

But

$$\boldsymbol{t} = \{\boldsymbol{e}^{\boldsymbol{x}},\ \boldsymbol{i}^{\boldsymbol{m}}\} \tag{5}$$

Hence,

$$\boldsymbol{y} = \boldsymbol{f}\left(\{\boldsymbol{e}^{\boldsymbol{x}},\ \boldsymbol{i}^{\boldsymbol{m}}\}^{\boldsymbol{\beta}}\right) \tag{6}$$

Where $\boldsymbol{e}^{\boldsymbol{x}}$ stand for export trade growth, and $\boldsymbol{i}^{\boldsymbol{m}}$ is import trade growth.

By placing a restriction on the coefficient of import trade in equation (6), we have

$$\boldsymbol{y} = \boldsymbol{f}\left(\{\boldsymbol{e}^{\boldsymbol{x}}\}^{\boldsymbol{\beta}}\right) \tag{7}$$

Decomposing export trade (e^x) into two namely oil export and non-oil export, we have

$$\boldsymbol{e}^{\boldsymbol{x}} = \{\boldsymbol{e}^{\boldsymbol{nx}}, \boldsymbol{e}^{\boldsymbol{ox}}\} \tag{8}$$

Where $\boldsymbol{e}^{\boldsymbol{ox}}$ represents oil export trade, and $\boldsymbol{e}^{\boldsymbol{nx}}$ stands for non-oil export trade.

Incorporating other variables such as inflation and exchange rate into the model,

$$\boldsymbol{y} = \boldsymbol{f}\left(\{\boldsymbol{e}^{\boldsymbol{nx}}, \boldsymbol{e}^{\boldsymbol{ox}}, \boldsymbol{i}^{\boldsymbol{r}}, \boldsymbol{e}^{\boldsymbol{r}}\}^{\boldsymbol{\beta}}\right) \tag{9}$$

Where i^r stands inflation rate, $\boldsymbol{e}^{\boldsymbol{r}}$ is exchange rate, while β represents vectors of coefficients.

This is a panel-based study involving 14 oil-producing SSA countries. The linear form of the model within the panel framework is given by

$$\boldsymbol{y}_{\boldsymbol{it}} = \boldsymbol{\beta}_{\boldsymbol{i}} + \boldsymbol{\Upsilon}_{\boldsymbol{1}}\boldsymbol{e}_{\boldsymbol{it}}^{\boldsymbol{nx}} + \boldsymbol{\Upsilon}_{\boldsymbol{2}}\boldsymbol{e}_{\boldsymbol{it}}^{\boldsymbol{ox}} + \boldsymbol{\Upsilon}_{\boldsymbol{3}}\boldsymbol{i}_{\boldsymbol{it}}^{\boldsymbol{r}} + \boldsymbol{\Upsilon}_{\boldsymbol{4}}\boldsymbol{e}_{\boldsymbol{it}}^{\boldsymbol{r}} + \boldsymbol{u}_{\boldsymbol{it}} \tag{10}$$

But Equation (10) can be re-expressed in a more compact form as

$$\boldsymbol{y}_{\boldsymbol{it}} = \boldsymbol{\Upsilon}\boldsymbol{X}_{\boldsymbol{it}} + \boldsymbol{\beta}_{\boldsymbol{i}} + \boldsymbol{u}_{\boldsymbol{it}} \tag{11}$$

Where $\boldsymbol{y_{it}}$ is the endogenous variable for individual $\boldsymbol{i}$ during the time period $\boldsymbol{t}$, $\boldsymbol{\beta_i}$ is an unobserved individual effect, $\boldsymbol{u_{it}}$ is the idiosyncratic error, $\boldsymbol{\Upsilon}$ is a $k\ x$ 1 vector of parameters to be estimated**,** $\boldsymbol{t}$ is time period, such that, t = 1, 2,…T, and $\boldsymbol{i}$ is number of cross-section, such that, i = 1, 2, …N. In case $\boldsymbol{\beta_i}$ correlates with $\boldsymbol{u_{it}}$**,** the model is referred to as fixed effect model, but if otherwise, the model is called random effect model.

3.1.1 Choosing between fixed effects and random effects models

To find out the preferred models from either fixed effect or random effect model, Hausman test was conducted. Hausman test follows a chi-square statistic to test the null hypothesis that random effects are consistent and efficient as against alternative hypothesis that random effects are inconsistent implying that the fixed effects will always be consistent. The statistic used is expressed as

$$\boldsymbol{H} = \left(\widehat{\boldsymbol{\beta}}^{\boldsymbol{FE}} - \widehat{\boldsymbol{\beta}}^{\boldsymbol{RE}}\right)^{\mathbf{1}}\left[\boldsymbol{Var}\left(\widehat{\boldsymbol{\beta}}^{\boldsymbol{FE}}\right) - \boldsymbol{Var}\left(\widehat{\boldsymbol{\beta}}^{\boldsymbol{RE}}\right)\right]^{-\mathbf{1}} - \left(\widehat{\boldsymbol{\beta}}^{\boldsymbol{FE}} - \widehat{\boldsymbol{\beta}}^{\boldsymbol{RE}}\right) \backsim \chi^{\mathbf{2}}(K) \quad (12)$$

3.2 Unit Root Tests

In panel econometrics modelling, the most widely used tests for detecting the stationarity properties of panel data are LLC (Levin, Lin and Chu, 2002) and IPS (Imps, Pesaran and Sims, 2003). The null hypothesis which states that serial unit contains root is tested again an alternative hypothesis which states that serial unit does not contain root. When a serial unit contains root, it implies the series is not stable. It is non-stationary. On the other hand, when a serial unit contains no root, it implies the series is stable over time. It is said to be stationary. The unit root regression model under LLC unit root test with a test statistic with standard normal distribution is specified as

$$\Delta\boldsymbol{G_{i,t}} = \boldsymbol{\beta}^{*}\boldsymbol{G_{i,t-1}} + \sum_{\boldsymbol{L=1}}^{\boldsymbol{Pi}} \boldsymbol{\phi_{iL}}\Delta\boldsymbol{G_{i,t-L}} + \boldsymbol{\lambda_{mi}}\,\mathrm{d}_{\boldsymbol{mt}} + \boldsymbol{e_{i,t}}$$
(13)

Where $\boldsymbol{G}$ is the vector of variables in the study, $\boldsymbol{m}$ is the available models for consideration ranging from model 1, model 2 and model 3, while $\boldsymbol{pi}$ is the lag order which is unknown and allowed to vary across individuals. $\boldsymbol{i}$ is the number of cross-sectional units, $\boldsymbol{t}$ is time period, Δ is the first difference operator, and $\boldsymbol{G_{i,t}}$ has an individual-specific mean and linear and individual-specific time trend. The null hypothesis of unit root is tested against the alternate hypothesis of no unit root

$\mathbf{H_0}$**:** $\boldsymbol{\beta}^{*}$ **= 0,** for all $\boldsymbol{i}$

$\mathbf{H_1}$**:** $\boldsymbol{\beta}^{*}$**< 0,** for all $\boldsymbol{i}$

The study considers model 3 in which case $\boldsymbol{m = 3}$; $\mathrm{d}_{\boldsymbol{mt}} = \mathrm{d}_{\boldsymbol{3t}}$ = $(\mathbf{1}, \boldsymbol{t})$ in which case the series $\boldsymbol{G_{i,t}}$ has an individual-specific mean and linear and individual-specific time trend.

In a similar manner, the IPS unit root regression model takes the form

$$\Delta\boldsymbol{G}_{\boldsymbol{i,t}} = \text{Л}^*{}_{\boldsymbol{i}}\boldsymbol{G}_{\boldsymbol{i,t-1}} + \sum_{\boldsymbol{j=1}}^{\boldsymbol{pi}} \boldsymbol{\xi}_{\boldsymbol{ij}}\Delta\boldsymbol{G}_{\boldsymbol{i,t-j}} + \boldsymbol{\Psi}_{\boldsymbol{mi}}\,\mathrm{d}_{\boldsymbol{mt}} + \epsilon_{\boldsymbol{i,t}} \tag{14}$$

Where $\boldsymbol{G}$ stands for the vector of variables in the study, $\boldsymbol{m}$ is the available models for consideration = 1, 2, 3, $\boldsymbol{pi}$ represents the lag order which is allowed to vary across individuals, $\boldsymbol{i}$ is the number of cross-sectional units**,** $\boldsymbol{t}$ is the time period, and Δ stands for the first difference operator

The null hypothesis ($\mathbf{H_0}$) of unit root is tested against the alternate hypothesis ($\mathbf{H_1}$) of no unit root

$\mathbf{H_0}$**:** $\text{Л}^*{}_i$ **= 0,** for all $\boldsymbol{i}$

$\mathbf{H_1}$**:** $\text{Л}^*{}_i$ **< 0,** for all $\boldsymbol{i} = \mathbf{1}, \ldots \ldots \ldots, \mathbf{N_1}$

$\text{Л}^*{}_i = 0 \; for \; i = \mathbf{N_1} + \mathbf{1}, \ldots \ldots .., \boldsymbol{N}$

Similarly as in LLC, the study considers model 3 in which case $\boldsymbol{m} = \mathbf{3}$; $\mathrm{d}_{\boldsymbol{mt}} = \mathrm{d}_{\mathbf{3}\boldsymbol{t}} = (\mathbf{1}, \boldsymbol{t}\,)$ in which case the series $\boldsymbol{G}_{\boldsymbol{i,t}}$ has an individual-specific mean and linear and individual-specific time trend.

3.3 Cointegration tests

Cointegration test is necessary in modelling variables that are individually non-stationary especially when they are first difference stationary. For a variable to be stationary, it must be level stationary such that found no need of taking the first difference test before being stationary. A group of variables may be non-stationary individually but their linear combination might be stationary. This implies they are cointegrated. Once there is cointegration, there is causality evidence at least in one direction. This study employed two widely used cointegration tests, namely Pedroni and Kao panel cointegration tests. These tests are based on Engle and Granger procedure. The null hypothesis of no cointegration is drawn against the alternative hypothesis of cointegration.

This study estimates Pedroni panel cointegration regression model of the form

$$\boldsymbol{y}_{\boldsymbol{i,t}} = \boldsymbol{\lambda}_{\boldsymbol{i}} + \boldsymbol{\varphi}_{\boldsymbol{t}} + \sum_{\boldsymbol{k=1}}^{\boldsymbol{K}} \boldsymbol{\psi}_{\boldsymbol{ki}}\boldsymbol{R}_{\boldsymbol{ki,t}} + \boldsymbol{u}_{\boldsymbol{i,t}} \tag{15}$$

This approach proposes seven different cointegration statistics to capture the ‘within’ and ‘between’ effects. These seven approaches were categorized into two. The first includes four tests based on pooling along the ‘within dimension’ while the second consists of three tests based on pooling the ‘between dimension’. On the basis of these statistics, the null hypothesis of no cointegration was tested against the alternate hypothesis of cointegration.

The second cointegration test used in this study is Kao (1999) which presents Dickey-Fuller and Augmented Dickey-Fuller kind of cointegration tests in panel series. The Kao panel cointegration regression model takes the form

$$\boldsymbol{y_{i,t}} = \boldsymbol{\eta_i} + \boldsymbol{\varphi R_t} + \boldsymbol{e_{i,t}} \tag{16}$$

From Equation (16), the first order autoregressive, AR(1) model could be specified as

$$\boldsymbol{e_{i,t}} = \boldsymbol{\Omega e_{i,t-1}} + \boldsymbol{v_{i,t}} \tag{17}$$

Where e is the residual obtained after estimating Equation (16), $\boldsymbol{i}$ represent the cross-sectional unit and **t** the time period.

Kao proposes that residual-based cointegration test is applicable to Equation (17) following Dickey-Fuller unit root test. If the residual is found to be stationary, this could imply that cointegration exist but if otherwise, there is no cointegration meaning the null hypothesis of no cointegration cannot in any way be rejected.

3.4 Test of causality

The existence of cointegration among two or more economic variables implies that causality exist at least in one direction. Granger causality test thus has become an important test in econometric modelling of time series or panel data modelling. According to Granger (1969), an existence of correlation does not mean and it cannot be interpreted to mean causation. In order to ascertain the direction of causality and the fact that standard causality test do not provide cross-sectional results in heterogeneous panel data models, this study employed Dumitrescu-Hurling Granger non-causality test. Dumitrescu and Hurling (2012) developed this alternative test to determine the Granger non-causality in heterogeneous panel series. The model is of the form

$$\boldsymbol{Z_{i,t}} = \boldsymbol{\delta_i} + \sum_{\boldsymbol{p=1}}^{\boldsymbol{P}} \boldsymbol{\psi_i}^{(\boldsymbol{p})} \boldsymbol{Z_{i,t-p}} + \sum_{\boldsymbol{p=1}}^{\boldsymbol{P}} \boldsymbol{\eta_i}^{(\boldsymbol{p})} \boldsymbol{E_{i,t-p}} + \boldsymbol{\epsilon_{i,t}} \tag{18}$$

Where Z and E represent any pair of variables in this study. For instance, economic growth and oil export, economic growth and non-oil export, and so on. This procedure uses an average Wald tests to test, formally, the null hypothesis of homogeneous non-causality from either oil export or non-oil export to economic growth against the alternate hypothesis of causality from oil export or non-oil export to economic growth for at least one cross-section.

This study engaged in further analysis using panel autoregressive distributed lag (ARDL) modeling procedure, which is said to be of high power in modelling variables with mixed order of integration as experienced in this study. This estimation technique is employed in order to allay the fear over the properties of the data on key variables in this study despite the cointegration of individually non-stationary variables from Pedroni's and Kao's cointegration test results. This is necessary to validate the results earlier obtained from the previous analysis. The unrestricted ARDL model takes the form

$$\boldsymbol{y_{i,t} = \mu_i + \sum_{j=1}^{p} \phi_{i,j} y_{i,t-j} + \sum_{j=0}^{q} \Omega_{i,j} g^{*}_{i,t-j} + \epsilon_{i,t}} \tag{19}$$

Where $\boldsymbol{g^{*}_{i,t-j}}$ is a Kx1 vector of explanatory variables for group $\boldsymbol{i}$. $\boldsymbol{\mu_i}$ represents the fixed effects, $\boldsymbol{t}$ stands for 1, 2, …,T time periods, and $\boldsymbol{i}$ represents 1, 2, …, N countries, $\boldsymbol{\epsilon_{i,t}}$ is the error term, while p and q vary not across countries as a balanced panel

Re-parameterizing the model, a restricted ARDL model takes the form

$$\boldsymbol{\Delta y_{i,t} = \mu_i + \sum_{j=1}^{p-1} \xi_{i,j} \Delta y_{i,t-j} + \sum_{j=1}^{q-1} \eta_{i,j} \Delta g^{*}_{i,t-j} + \beta^{*}_{i} ecm_{t-1} + \varepsilon_{i,t}} \tag{20}$$

Equation (20) can be expressed in a more explicit form as

$$\boldsymbol{\Delta y_{i,t} = \mu_i + \sum_{j=1}^{p-1} \xi_{i,j} \Delta y_{i,t-j} + \sum_{j=1}^{q-1} \eta_{i,j} \Delta g^{*}_{i,t-j} + \beta^{*}_{i} \left(y_{i,t-1} - \Omega_i g^{*}_{i,t-1} \right) + \varepsilon_{i,t}} \tag{21}$$

Where $\boldsymbol{\Omega_i}$ stands for the long-run coefficients, and β^{*}_{i} represents the coefficients of the error correction terms with one period lag. The criterion used for optimal lag selection is Schwarz Information Criterion. The pooled mean group restriction is that the elements of $\boldsymbol{\Omega}$ are common across countries.

3.5 Variables Description and Measurement

The variables in this study are economic growth measured by natural logarithm of GDP per capita in current US dollar. Export trade variable are decomposed into two, namely oil export and non-oil export. The natural logarithm forms of these variables were used to capture export trade variables. Other variables include exchange rate captured by natural logarithm of official exchange rate. Inflation rate is computed in percentage. It measures the price dynamics in the affected countries. Both exchange rate and inflation rate affect consumption both at foreign and domestic markets.

4.0 Empirical Analysis

The result of the descriptive analysis as shown in Table 1 shows that the average income per capita for the group during the period of analysis is US $1,981 with average oil export worth of about ($US738million). For non-oil export, it is worth of about US $6.34billion with about 94 per cent rate of inflation as the group average and average exchange rate of 272 of local currency unit exchange for one US dollar (LCU272=US$1).

Variables	**Mean**
GDPPC (in US dollar)	1981.46
OILEXPT (in millions of US dollar)	738.00

NOILEXPT (in billions of US dollar)	6.34
OFEXCR (LCU exchange for $1US)	271.73
INFRT (% change in consumer prices over time)	94.36

Table 1: Results of Descriptive Summary of the Study Variables

Source: Authors' Compilation

Table 2: Average per capita GDP side by side with group average

Country	**Average GDP per capita** (US $)	**Group Average** (**US $**)
Angola	2873	1981
Cameroon	1031	1981
Chad	445	1981
Congo	304	1981
Congo DRC	1492	1981
Cote d'Iivoire	999	1981
Equatorial Guinea	6236	1981
Gabon	6014	1981
Ghana	789	1981
Mauritenia	764	1981
Niger	283	1981
Nigeria	1281	1981
South Africa	4303	1981
Sudan	893	1981

Source: Authors' Compilation

The result in Table 2 presents the average per capita GDP side by side with the group average. This analysis reveals the true picture of how each country stands in comparison with the overall group performance. For instance, from the result, it is clear that only four countries have their per capita GDP above the group average of US $1,981) while the rest have lesser. Some of these countries even have their per capita GDP lesser than US$500) which is a sign of poor economic performance. Figure 1 shows that Equatorial Guinea has the highest GDP per capita during the period under investigation, followed by Gabon, South Africa, and Angola.

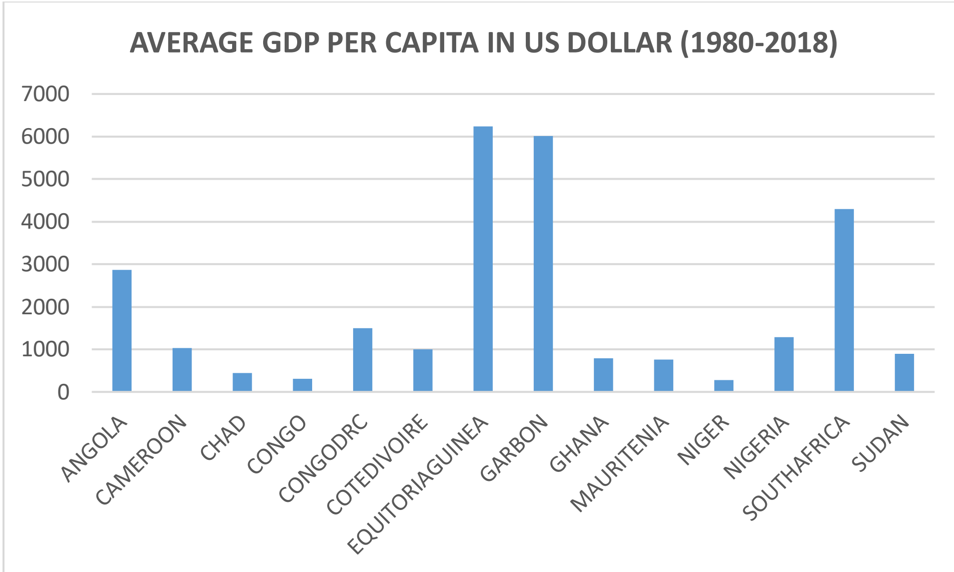

Figure 1: Distribution of Countries by Average GDP per capita (1980–2018)
Source: Authors' Compilation

4.2 Test of Equality of Means and Variances of Series

The test of equality of means and variances of series across countries was conducted using Anova F-test and Welch F-test to compare means of each of the series and Levene test to compare the variances of the series across the countries. The result presented in Table 3 shows that there is significant difference in means of series with Anova F-statistic of 3.3909 with p-value of 0.009 less than not just 0.05 level but also 0.01 level. The result shows that there is significant difference in variances between series with Levene statistic of 12.1003 with p-value of 0.000, which indicates statistical significance at 0.01 level.

Table 3: Results of Tests of Equality of Means and Variances of Series

Variables	Mean	Stardard Deviation	Standard Error of Mean
LGDPPC	6.91	1.13	0.049
LOFEXCR	2.72	6.02	0.258
INFRT	94.21	1062.05	45.45
LOILEXPT	18.14	2.48	0.11
LNOILEXPT	21.29	1.58	0.07
	Mean*		
Source of Variation	**df**	**Sum of Square**	**Mean Square**
Between	4	3061078	765269.5
Within	2724	615000000	225682.6
Total	2728	618000000	226473.8
Method	**df**	**F-stat**	**p-value**
Anova F-test	(4, 2724)	3.3909	0.0089
	Variance*		
Method	**df**	**F-stat**	**p-value**
Levene test	(4, 2724)	2.1003	0.0000

** denotes rejection of the hypothesis of no significant difference in means and variances of series at 1% level*
Source: Authors' Compilation

4.3 Panel Unit Root Tests

In order to test for the stationarity properties of the variables involved in the analysis, this study conducted panel unit root tests developed by Lin, Lu, and Chu (2002), and Im, Pesaran, and Shin (2003) to test the presence of unit root on each of the variables. The LLC is based on the assumption of homogeneous panel while the IPS is based on the assumption that panel is heterogeneous. The result presented in Table 4 shows that both the LLC and IPS agreed on the order of integration of each of the variables involved. Three variables: GDP per capita, non-oil export, and exchange rate were found to be stationary after first differencing, indicating integrated of order 1. The remaining two variables: inflation rate and non-oil export were found to be stationary at level meaning they are integrated of zero order i.e. I(0) variables.

Table 4: Results of Panel Unit Root Tests

Variables	LLC	Order of Integration	IPS	Order of Integration
LGDPPC	0.029	-	1.087	-
∆LGDPPC	-16.553*	I(1)	-15.370*	I(1)
LFEXCR	0.794	-	1.516	-
∆LFEXCR	-8.074*	I(1)	-12.140*	I(1)
INFRT	-12.263*	I(0)	-10.659*	I(0)
LOILEXPT	-6.407*	I(0)	-7.993*	I(0)
LOILEXPT	-0.732	-	-0.695	-
∆LOILEXPT	-16.175*	I(1)	-15.582*	I(1)

** denotes rejection of the hypothesis of unit root at level at 1% and 5% significance level respectively*

4.4 Panel Cointegration Tests

This study employed panel cointegration tests developed by Pedroni (1999) and Kao (1999) to confirm if the linear combinations of individually non-stationary variables converge to a long run equilibrium. Existence of cointegration is a confirmation of causality at least in one direction (Granger, 1969). The result presented in Table 5 shows that cointegration relation exists among the variables. From both the within group and between group dimensions, there is evidence of cointegration. The p-value obtained for each of the within group statistics is less than 0.01 except for Panel-rho, which is only less than 0.05. For the between group cointegration tests, two of the three statistics, Group-PP and Group-ADF are significant at both 5% and 10% respectively. From the table, the result of Kao's cointegration test also shows that there is existence of cointegration, the ADF (t-statistic) of -36713 has p-value of 0.0001. The existence of cointegration is a proof of causality evidence.

Pedroni's Cointegration Tests

Table 5: Results of Panel Cointegration Tests

Dimension	Test	Statistic (p-value)
Within Group Cointegration Tests	Panel-v	2.9254 (0.0017)*
	Panel-rho	-1.9506 (0.0256)*
	Panel-PP	-3.5256 (0.0002)*
	Panel-ADF	-3.1197 (0.0009)*
Between Group Cointegration Tests	Group-rho	0.2013 (0.5798)
	Group-PP	-1.8459 (0.0325)**
	Group-ADF	-1.4952 (0.0674)***
Kao's Cointegration Tests	ADF(t- Stat)	-3.6713 (0.0001)*

** (**) [***] denote rejection of the hypothesis of no cointegration at 1% (5%) [10%] significance level*

Source: Authors' Compilation

4.4 Panel Regression Results

To obtain the magnitude and direction of relationship between each of the export trade variables and economic growth measured with gross domestic product per capita, the result of the estimated fixed effects model was used having being the preferred model. The results are presented in Table 6. Economic growth responds negatively to increase in oil export trade. For instance, a 10% increase in oil export caused economic growth to fall by about 0.4%. The result also showed that economic growth responds positively to increase in non-oil export trade. For instance, a 10% increase in non-oil export trade caused economic growth to rise by about 7.7%. So, non-oil export trade is a strong factor of economic growth in these countries. Both the oil and non-oil exports have significant influence on economic growth but in the opposite direction. Oil export significantly pulled down economic growth while non-oil export significantly pushed it upward. Both exchange rate and inflation also have negative effects on growth. While exchange rate significantly caused reduction in economic growth, the effect of inflation is not significant. The magnitude of the effect of inflation on growth is glaringly low while that of exchange rate is severe on economic growth. The reason for this might be as a result of high propensity to consume foreign goods as most of these countries are import dependent.

Table 6: Results of Panel Regression DV = LGDPPC

Variables	Fixed Effects Coefficient	P-value	Random Effects Coefficient	P-value
LOILEXPT	-0.0421	0.0006*	-0.0423	0.0006*
LNOILEXPT	0.7709*	0.0000*	0.7638*	0.0000*
INFRT	-6.50E-7*	0.9652	-1.42E-06	0.9242
LOFEXCR	-0.0474	0.0000*	-0.0462	0.0000*
Hausman Test	$\chi^2 - 15.314(0.0041)^*$			

** denotes rejection of the null hypothesis at 1% significant level*

Source: Authors' Compilation

4.5 Causality Tests

The issue of existence of causality is already settled due to the evidence of cointegration. It is one thing to confirm the existence of causality and it is another thing to establish the direction of causation. This study, in order to find out the direction of causality between export trade variables and economic growth, adopted a causality models proposed by Dumitrescu and Hurlin (2012). This test is based on W-Stat and Zbar-Stat. The result in Table 7 shows that bidirectional causality exists between oil export and economic growth as well as non-oil export and economic growth. This result corroborates with some earlier studies particularly Grossman and Helpman (1991), Riezman, Summers and Whiteman (1996), Afxentiou and Serletis (1991) as well as Shan and Sun (1998). The result also is partially in tandem with some recent studies such as Wernerheim (2000) for Canada, Abdulnasser (2002) for Japan, Awokuse (2005) for Korea, Mehrara (2011) for 73 developing countries. The result is also in conformity with some more recent studies such as Guntukula (2018) for India, Sunde (2017) for Republic of South Africa (RSA), Shakeel and Ahmed (2020) for a panel of five South Asian countries, though only in the short run, as well as Tang and Abosedra (2019). The result is in conflict with those that either find unidirectional causality or those that find no causality between export trade and economic growth. The sign of the coefficient of oil export in the FEM model is negative while that of non-oil export is positive. This implies that non-oil export trade enhances the growth process and hence, should be expanded to achieve further growth in these countries. Conversely, the result suggests that oil export trade causes a significant reduction in economic growth process of these countries lending evidence to the existence of resource-course scenario.

Table 7: Pairwise Dumitrescu Hurlin Panel Causality Tests

Null Hypothesis	W-Stat	Zbar-Stat	P-value
Oil export does not homogeneously cause economic growth	3.977	3.025	0.0025*
Economic growth does not homogeneously cause Oil export	6.685	7.467	0.0000*
Non-oil export does not homogeneously cause economic growth	6.771	7.609	0.0000*
Economic growth does not homogeneously cause non-oil export	4.078	3.191	0.0014*

** denotes rejection of the hypothesis of no causality at 1% level of significance*

Source: Authors' Compilation

4.6 Evidence from Panel ARDL

The result of Panel ARDL is presented in Tables 8 and 9. The result in Table 8 shows the short run effect of each of the explanatory variables on economic growth. From the table, oil export has positive but insignificant effects on growth. The non-oil export on the contrary has positive and significant effect on growth. Exchange rate has negative and significant effect on economic growth. Inflation on its own has negative but insignificant effect on growth. The result in Table 9 shows the long-run growth effect of each of the variables. From the table, oil export has negative and significant effect on growth. The non-oil export on the contrary has positive and significant effect on growth. Both exchange rate and inflation have negative effect on growth in the long run. Oil export was found to have negative effect on economic growth of these countries in the long run in conformity with the previous result obtained from fixed effect models. With this finding, the existence of resource-curse scenarios is confirmed. This result provides empirical evidence in favour of non-oil export-led growth strategy in these countries.

Table 8: Result of Short Run Panel ARDL Estimate

DV=LGDPPC			
Variable	**Coefficient**	**t-Stat**	**P-value**
ECT_{-1}	-0.1788*	-4.88	0.0000
$\Delta LOILEXPT$	0.0169	1.36	0.1737
$\Delta LNOILEXPT$	0.1147***	2.27	0.0234
$\Delta LOFEXCR$	-0.3789*	-5.14	0.0000
$\Delta INFRT$	-0.0001	-0.12	0.9065
$CONSTANT$	-0.8385*	-3.99	0.0001

**, and ** denotes rejection of the hypothesis of no significant effect at 1% and 5% respectively*
Source: Authors' Compilation

Table 9: Result of Long-run Panel ARDL Estimate

DV=LGDPPC			
Variable	**Coefficient**	**t-Stat**	**P-value**
$LOILEXPT$	- 0.0644*	-4.88	0.0000
$LNOILEXPT$	0.5973*	12.45	0.0000
$LOFEXCR$	-0.3789*	-3.01	0.0028
$INFRT$	-0.0001	-0.42	0.6755
$CONSTANT$	-0.8385*	-3.99	0.0001

** denotes rejection of the hypothesis of no significant effect at 1% level*
Source: Authors' Compilation

5.0 Summary, Recommendations and Conclusion

Economic growth is a great concern for any economy whether developed, emerging, or developing in status. Different economies of the world have been adopting several options to achieve substantial economic growth. The extent to which the Export-led Growth Hypothesis (ELGH) is applicable to the growth pattern of different economies of the world remain a hot debate among researchers and policy makers because of the mixed conclusions obtained from different studies. Different export items explain economic growth differently. An export component that enhances economic growth in one country or region may harm economic growth in another. This study investigates the validity of export-led growth hypothesis and existence of resource-curse scenario in 14 oil-producing Sub-Saharan African (SSA) countries using decomposition of export trade with panel data set spanning from 1980 to 2018.

The study first engaged in descriptive analysis of the variables in the study. Both ANOVA and Levene F-tests were used to confirm if there is significant difference in mean and variance of each of the series. Then, panel unit root test was carried out to account for the stationarity properties of the series while panel cointegration test of Pedroni's and Kao's were used to test whether the variables are cointegrated or otherwise. The empirical results to validate the export-led growth hypothesis in this study are in two folds. First, the sign of coefficient of each of the export trade variables is expected to be positive and significant, second, there must be causal evidence running from each of the export trade variables to economic growth with no reverse causation or feedback. The result form all the cointegration test confirmed that the series are cointegrated which indicate that they converge to a long run equilibrium. The result obtained from fixed effect models shows that oil export trade, inflation and exchange rate have negative effect on economic growth. Both oil export trade and exchange rate have a strong contractionary effect on growth. To capture the dynamics of export trade and economic growth, panel ARDL was used. The result show that oil export trade have an insignificant short run positive effect while non-oil export trade has a significant short run positive effect on growth. The long run effect of oil export was found to be negative and statistically significant while for non-oil export trade, the long run effect on economic growth was found to be positive and significant.

Panel causality test was conducted to find out the direction of causality between each of the export trade variables and economic growth. The result implies that oil export trade has a negative causal effect while non-oil export trade has a positive causal effect on economic growth in the long run. The result of Granger causality provides a support for bidirectional causality between each of the export variables and economic growth. The validation of ELGH requires a unidirectional causality running from export trade to economic growth and not the other way round. This is not in line with the finding of this study since there is feedback from growth to export trade variables making our finding here to be two-way causal relation against one-way causal relation which must run from export trade to economic growth required of ELGH to be validated. On this basis the ELGH cannot be validated in the case of the 14 oil-producing SSA countries. In the long run, while the non-oil export was found to have an expansionary effect on growth, the oil export was found to have a contractionary effect on economic growth confirming the existence of resource-curse scenario as what seems to be a blessing has turned out to be a curse. By this finding, the existence of a resource-curse scenario has been evidenced in these countries.

The policy implication of this finding is that both export promotion and output enhancement policies should be rigorously pursued since they both affect each other. However, the export promotion strategy should be biased towards the non-oil export trade which have positive and significant causal effect on economic growth. Income enhancement in the region is very key to economic development since the result of descriptive analysis reveals that the per capita income is very low and a significant income inequality was found in these countries. For effective demand to be achievable, there is need for income to be relatively competitive to boost the purchasing power and standard of living in these economies. The study calls for diversification from oil export to non-oil export particularly agricultural and manufacturing exports to boost rapid economic growth. The huge oil-wealth that is usually associated with the boom era should always be used judiciously to develop the non-oil sub-sector to expand the sector to facilitate a sustainable economic growth. The oil sector is characteristically known to be very unstable and unpredictable, highly vulnerable to external shocks that might not be helpful to a smooth implementation of development plans and aspirations. Hence, the need to thread the stable and more predictable growth path to escape from this resource-curse phenomenon. What has been divinely given as a blessing should not be humanly turned into a curse just as a result of a mere mismanagement.

The study therefore concluded that, while the export-led growth hypothesis cannot be validated, there is strong empirical evidence of existence of resource-curse scenario in the 14 oil-rich Sub-Saharan African countries.

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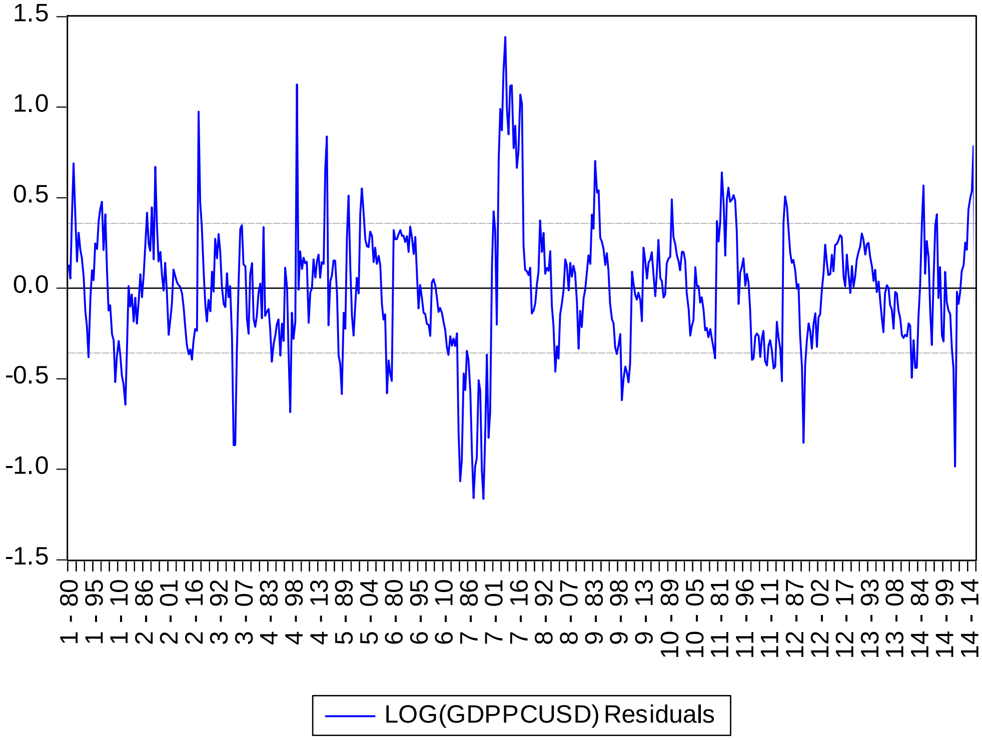
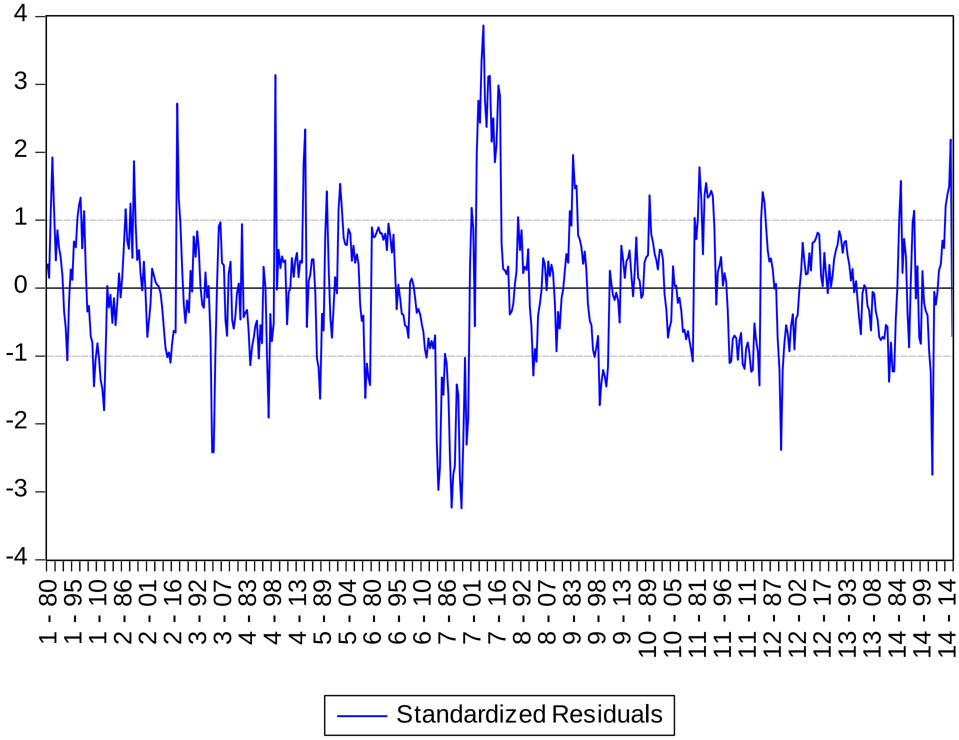
Appendix: Behaviour of the Residuals





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