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Export-Led Growth Hypothesis: Empirical Evidence from Selected Sub-Saharan African Countries

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Abstract

The objective of this study is to examine the validity of Export-Led Growth (ELG) hypothesis in selected Sub-Saharan African (SSA) countries for the period from 1985 to 2014. A new generation panel data approach is applied such as panel unit root, panel cointegration, Fully Modified OLS (FMOLS) and Dynamic Ordinary Least Square (DOLS). The empirical findings revealed that the panel unit root is stationary after the first difference and presents a cointegration. After the confirmation of panel cointegration, there exists a long-run relationship between exports and growth based on FMOLS and DOLS results. FMOLS and DOLS estimation showed a positive impact of investment, government expenditure and exports on the economic growth. Hence, the findings proved that export-oriented growth strategy is valid in the SSA countries.

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Keywords: Export; economic growth; panel data; Sub-Saharan Africa

1. Introduction

Africa is one of the world's poorest continents (Basu et al., 2005). Over the last 20 years, Sub-Saharan African (SSA) countries started enjoying robust and sustained economic growth. After the growth expanded by 4.9% in 2013, the economic performance is expected to continue increasing about 5.5% in 2015 (IMF, World Economic Outlook

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database, 2014). The strong economic performance is mainly driven by investments in the mining activities, infrastructure for transport and communication, and energy production. In the early of 1960s, policy makers and scholars showed an interest in the relationship between exports and economic growth. However, there is still an ongoing debate among scholars. Numerous studies, both theoretical and empirical have been undertaken to validate the ELG hypothesis and SSA countries are getting less attention in academic discussions.

Cross-country studies such as Abu-Quarn and Abu-Bader (2004) supported a positive relationship between export and growth in the developing countries, while few groups of studies investigated the causal relationship between export and output growth for individual countries using Granger's (1969) or Sims' (1972) causality test. Among these studies are Dodaro (1993), Sharma and Dhakal (1994), and Riezman et al. (1996). In fact, another group of studies used cointegration techniques to examine the long-run relationship between exports and output of individual countries such as Bahmani-Oskooee and Alse (1994) and Bahmani-Oskooee and Economidou (2009). Overall of these studies suggested that there is a positive long-run relationship between exports and output, and causality is running from exports to output or in both directions in the most of the developing countries.

Giles and Williams (2000) reviewed more than 150 export-growth papers which fell into three groups of studies. The first group of studies was based on cross-country rank correlation coefficients, second group applies cross-sectional regression analysis and third group employs time series techniques on a country-by-country basis. Two thirds of this paper is owned by the third group and more than 70 are papers based on Granger causality tests.

In addition, this study does not belong to any of these groups. Additionally, voluminous literature focused on developing countries that utilized cross-sectional data, production function, and time series data. On the other hand, far too little attention has been paid to the panel data technique in the Sub-Saharan African countries that this paper seeks to investigate. One of the primary reasons to utilize the panel unit root tests for cross-sectional data is because this test can increase the statistical power of univariate counterparts as compared to the traditional Augmented Dickey-Fuller test (ADF) (Dickey-Fuller, 1979) characterized to have a low power in rejecting the null of non-stationary of the series, especially for short-spanned data. Recent literature suggests that a new generation of panel unit root tests has a higher power that is able to capture the country-specific effects, heterogeneity in the direction and magnitude of the parameters across the panel, and weak restrictions.

Against this background, presently scholars and policy makers have raised issues on the relevancy of export-led growth hypothesis strategy as an appropriate development tactic to achieve the MDGs (Millennium Development Goals) 2015 in the SSA countries. The importance of economic transformation in the SSA countries is a key to achieve the Millennium Development Goals 2015 to improve their standard of living and reduce poverty, hunger, maternal and child deaths, disease and gender inequality. Hence, this study intends to re-examine the ELG hypothesis with a new panel data approach in selected Sub-Saharan African countries, namely; Botswana, Equatorial Guinea and Mauritius.This paper is organized into five sections. The second section discusses the literature review. The third section describes data sources, whereas the methodology and empirical evidence are presented in section four. The final section concludes the paper with important findings and policy implications.

2. Review of literature

ELG hypothesis has been done by many researchers using different econometric techniques. In general, recent empirical literature has shown that causality relations vary with the period of study, the use of econometric methods, treatment of variables (nominal or real) whether one-way or two-way linkages, and the presence of other related variables or inclusion of interaction variables in the estimated equation.

Exports-growth nexus which has still been a subject of extensive debate since the 1960s was also studied by Giles and Williams (2000). It was surprising that there is no clear consensus between the export-led-growth and growth-led-exports even though early cross-section studies favored the past. Wernerheim (2000) found bidirectional causality between exports and growth by using cointegration and causality test. However, only few papers applied the panel data causality analysis.

Several literatures argued that positive productivity effects estimated by export-led growth hypothesis do not necessarily occur in developing countries. This is because most of the developing countries are heavily dependent on primary commodity exports. At the same time, exports can lead economies to shift away from the competitive manufacturing sectors which have many externality factors required for sustainable growth. This is compared to the

primary export sector which does not have many linkages and spillover into the economy (Sachs & Warner 1995; Herzer 2007). In addition, increased exports of primary goods are subjected to large price and volume fluctuations. Simultaneously, increased exports may increase macroeconomic uncertainty that can impede efforts for economic planning and reduce the quantity as well as the efficiency of domestic investment (Dawe, 1996).

In fact, there are four groups of studies which employed panel cointegration in which the tests have higher power due to the exploitation of both time-series and cross-sectional dimensions of the data. By examining export-led growth hypothesis, these groups of studies show that the results are mixed. Bahmani-Oskooee et al. (2005) and Reppas and Christopoulos (2005) concluded that long-run causality is a unidirectional running from GDP to exports, whereas the results of Parida and Sahoo (2007) revealed that the increased exports are the cause of increased GDP. On the other hand, Jun (2007) found positive long-run effects running from exports to GDP. Moreover, Reppas and Christopoulos (2005) analyzed 22 samples from the African and Asian countries, while Parida and Sahoo (2007) included only four South Asian countries. These studies did not engage with the validity of the export-led growth hypothesis or long-run effects of exports. This is because Parida and Sahoo (2007) and Jun (2007) used the within-dimension panel cointegration estimators, which were unable to capture the heterogeneity of the long-run coefficients across the countries.

Furthermore, the methods presented in these studies did not take into account the potential cross-sectional dependence which could generate biased results. Numerous researchers like Bahmani-Oskooee et al. (2005), Reppas and Christopoulos (2005), and Jun (2007) did not control the simultaneity bias associated with exports through national income as a component of GDP. Specifically, the finding showed a positive correlation between exports and growth because export is a part of GDP. Simultaneously, exports and output growth may lead to the misleading inferences on causality. In overall, these groups of studies only examined the long-run relationship between exports and output and did not account for possible differences between long-run and short-run effects of exports.

Another study by Li Yuhong et al. (2010) explored cointegration analysis with the data of import, export and economic growth. The results suggest that the growth of import promotes economic growth in China while export executes opposite one. The findings are also consistent with the study of Agasha (2009) whereby the determinant of export growth rate was significant in Uganda. However, not many studies were carried out in the case of Sub-Saharan African countries. Pazim (2009) worked on exports and growth in the panel data analysis, which includes the variables of government expenditure, gross domestic investment, labor force and inflation. The finding supports the ELG hypothesis for the African countries and this result is consistent with a number of studies that have been done in the African context such as Fosu (1990) and Ukpolo (1994).

In the recent years, a number of studies have been undertaken based on panel data that examined both inter and intra country frameworks to figure out the export-led growth hypothesis. The empirical analysis showed that the relationship between export, investment, growth and import based on panel granger causality holds the existing export-led growth (Ahumada & Sanguinetti, 1995). Konya (2006) employed seemingly unrelated regression (SUR) method to test the causality between export and GDP in the OECD countries and the test indicated a mixed result. In addition, following the same procedure for 18 least developed countries have supported the export-led growth (Tekin, 2012). However, based on the threshold regression technique between export and growth, the empirical outcome supports the export-led growth for a group of African countries (Foster, 2006). These findings are also similar with some studies such as Galimberti (2009), Seabra and Galimberti (2012). However, Mehrara and Firouzjaee (2011) found the existence of bidirectional causality between the non-oil export and economic growth for a group of countries.

Moreover, Bbaale and Mutenyo (2011) demonstrated that a sample of 35 Sub-Saharan African countries was included in the capital goods imports into the Cobb-Douglas production function with exports, GDP per capita, labor force, credits to the private sector, government consumption, and gross capital formation. Capital goods imports, which embody knowledge and technology can enhance productivity. Bbaale and Mutenyo (2011) found that one unit percentage increase in the capital goods imports will increase 0.03% GDP per capita at 1% significance level. The literature strongly supported the theoretical view that capital goods imports, especially from the technologically advanced countries contain the most current technological knowledge. Therefore, it also enhances economic growth via the knowledge and technology effects.

Apart from that, some studies utilizing the panel econometric methods are also conflicting. Fowowe (2011) investigated 17 African countries with panel data analysis existence of a homogenous bi-directional causality between financial development and economic growth. Compared to Demetriades and James (2011) who were using 18 SSA

countries for the period from 1975 to 2006 observed that while bank liabilities in Sub-Saharan Africa were found, the causality link between bank credit and growth were invalid. Meanwhile, Ahmed and Wahid (2010) who were using data from 15 SSA countries found a long-run equilibrium relationship between the financial development and economic growth, where financial development can act as an engine of growth and play an important role in the process of economic development.

Many developing countries are too heavily depending on the primary products as their main source of export income. Some studies argued that countries which concentrate on manufacturing exports will grow faster than those primary product exporters (Hausmann et al., 2007; Jarreau Poncet, 2012; Crespo-Cuaresma & Worz, 2005; Berg et al., 2012). This idea emphasized that export products with a high relatively technology will benefit from positive externalities in boosting the economic growth. Furthermore, Rao and Hassan (2011), Cooray (2012), Azam et al. (2013) and Imai et al. (2014) reviewed that technological transfer effect can stimulate economic growth through a work force.

Based on several reviews, there exists a wide empirical literature on causality relations between exports and economic growth, but panel data empirical estimation is still unresolved which this study seeks to investigate.

3. Data sources

This paper carried out a panel data analysis of export-led growth hypothesis for selected Sub-Saharan African countries, namely; Botswana, Equatorial Guinea and Mauritius over the period of 1985 to 2014. The data were taken from World Development Indicator (WDI) 2014 and International Financial Statistics (IFS) of the International Monetary Fund (IMF).

4. Methodology and empirical results

4.1 Panel unit root

In this study, the precondition of panel unit root tests were carried out before being proceeded to panel cointegration test. According to Im et al. (2003), all variables were tested both in level and first difference with constant and without constant. Panel unit root tests are reported in Table 1. The results have shown that unit root in level cannot be rejected while after the first difference, unit root is stationary. These tests are less restrictive and more powerful compared to the first generation tests developed by Levin and Lin (1993) (Hurlin & Mignon, 2005; Banerjee, 1999). The shortcoming of the first generation tests is not to allow for heterogeneity in the autoregressive coefficient. While the tests proposed by IPS allowed the solving of Levin and Lin's serial autocorrelation problem by assuming heterogeneity between units in a dynamic panel framework. The equation for panel unit root tests for IPS is as stated below:

$$\Delta Y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^{p} \phi_{ij} \Delta y_{i,t-j} + \varepsilon_{i,t} \quad \text{i = 1, 2, 3, … , N; t = 1, 2, 3, …, T} \tag{1}$$

where $y_{i,t}$ stands for each variable of the model, α_i is the individual fixed effect and ρ is selected to make the residuals uncorrelated over time. The null hypothesis is $\rho_i = 0$ for all i while the alternative hypothesis is $\rho_i < 0$ for some i = 1,…, N_1 and $\rho_i = 0$ for i = N_1 + 1,…, N.

Table 1
Panel unit root

Series	RGDP		INV		GOV		EXPORT	
	No Trend	Trend	No Trend	Trend	No Trend	Trend	No Trend	Trend
Level								
Levin, Lin	2.1602	0.2198	0.2779	-1.1149	1.0233	0.6412	0.6633	1.7410
IPS	0.5646	-1.4321	-1.6215	-2.5488	0.2251	-1.9693	-0.2386	-1.7472
ADF-Fisher	0.602	1.7478	6.9200	8.0998	0.2427	3.4663	1.0425	4.4208
First Difference								
Levin, Lin	-3.5491***	-3.6141***	-4.4637***	-3.3127***	-4.2377***	-3.9916***	-2.0729**	-1.9911**
IPS	-3.5124***	-3.9427***	-4.3536***	-4.5006***	-3.3827***	-3.4519***	-2.9747***	-3.0107**
ADF-Fisher	24.6051***	22.358***	35.5072***	28.5366***	22.8203***	16.3739**	17.8889***	11.6538*

Note: *, **, and *** denote rejection of the null of non-stationary at 10%, 5% and 1% levels of significance. SBC is used to select the lag length.

4.2 Panel cointegration tests

After all the variables are stationary in the first difference, Pedroni's cointegration test is applied in this study. Panel cointegration tests proposed by Pedroni (2000, 2004) also take heterogeneity into account the using of specific parameters that were allowed to vary across individual members of the sample. In the Pedroni's tests, seven different cointegration statistics were proposed to capture the within (pooled) and between (group mean) effects which are classified into two categories. For the tests based on "Within", the alternative hypothesis is $\rho_i = \rho < 1$ for all i, while the tests based on "Between" dimension, the alternative hypothesis is $\rho_i < 1$, for all i. Table 2 shows the results of Pedroni's (2004) cointegration tests with four within-group tests and three between-group tests which indicate the presence of cointegration relationship among the variables.

Table 2
Pedroni panel cointegration test results
(Dependent variable: Real GDP)

	Without Trend	With Trend
Within Dimension		
Panel v-stat	-0.1736	1.2015
Panel rho-stat	-0.4539	-0.4193
Panel pp-stat	-2.0257**	-2.7162***
Panel adf-stat	-2.1920**	-2.7162***
Between Dimension		
Group rho-stat	0.7734	0.4821
Group pp-stat	-1.4929*	-1.8691**
Group adf-stat	-2.2666**	-1.8691**

Notes: *, **, *** denote significance level at 10%, 5%, and 1% levels, respectively. Maximum lags on Schwartz information criterion (SIC) is 2.

4.3 Panel cointegration estimation

Pedroni's cointegration methodology only allows testing for the presence of cointegration but cannot estimate the long-run relationship between the variables in a panel framework, so Fully Modified OLS (FMOLS) and Dynamic

OLS (DOLS) are proposed in this paper. FMOLS or DOLS estimator is more reliable in the cointegrated panel regression. Kao and Chiang (2000) showed that both OLS and Fully Modified OLS (FMOLS) exhibit small sample bias while the DOLS estimator appears to outperform both estimators. In fact, DOLS method can correct the endogeneity bias and serial correlation. Table 3 presents the results of FMOLS and DOLS estimations. The estimated coefficients of the three indicators estimated by FMOLS and DOLS are positive and statistically significant at 1% and 5% level in Botswana, Equatorial Guinea and Mauritius. This study is in line with Ciftciouglu and Begovic (2008) and Adams (2009) who reported a positive relationship between investment and growth while Loizides and Vamvoukas (2005) showed a positive relationship between government and economic growth. Furthermore, the long-run linkage between exports and economic growth indicates a positive and significant relationship with 1% increase in exports will increase 0.62% and 0.63% of real GDP estimated by FMOLS and DOLS. This result is consistent with the findings of Marwan et al. (2013), Aditya and Acharyya (2013), and Ullah et al. (2009) who found that exports positively affect the economic growth. Other than that, Dollar and Kraay (2000) also revealed that economies that are more open to trade and capital flows have higher GDP per capita and grow faster. Thus, there is an existence of a long-run relationship among the variables.

Table 3
Results of FMOLS and DOLS estimations

	FMOLS	DOLS
LINV	0.1152 (0.0231)**	0.1414 (0.0349)**
LGOV	0.1488 (0.0015)***	0.1409 (0.0165)**
LEXPORT	0.6165 (0.0000)***	0.6322 (0.0000)***

Notes: ** and *** denote significance at 5% and 1% levels, respectively. Figures in parentheses are p-values**.**

5. Conclusion and policy implication

This paper examines the validity of export-led growth hypothesis in selected Sub-Saharan African countries, namely; Botswana, Equatorial Guinea and Mauritius over the period from 1985 to 2014. The recently developed panel methods, panel unit root tests, panel cointegration, FMOLS and DOLS approach have been used to deal with the heterogeneity problem in this study. The results of the panel unit root tests strongly indicate that the variables are non-stationary in level and stationary in the first difference. In fact, panel cointegration estimation also presents a long-run relationship among the variables.

The effect of export-led growth was positive and highly statistically significant. This finding is in line with Emilio (2001) who found that in developing countries, exports significantly have impact on economic growth. Exports can explain not only the cyclical changes in output (short-term) but also in the long-term trend of output. This result corroborates the ideas of many researchers such as Sentsho (2002), Broda and Tille (2003), and Musonda (2007) who discovered that exports positively affect the economic growth.

Last but not least, the empirical findings provide important implications for policy makers. A stable macroeconomic environment, better infrastructure, and rising agricultural productivity yield the most favorable effects on the economic growth. Moving to the determinants of export diversification, this analysis confirms a positive relation between the degree of diversification and the development of a country, as represented by the significant positive coefficient of real GDP. This result is consistent with the recent empirical studies like Agosin et al. (2012), Tadesse and Shukralla (2013), as well as those that include the specific African countries (Cabral & Veiga, 2010; Osakwe, 2007) which proved that countries at an early stage of development have larger opportunities to diversify. Likewise, fiscal policy also plays a vital role in promoting economic growth particularly through investments in human capital. Between 2000 and 2013, a widespread of increase in GDP per capita about 75% in the SSA countries has

helped to improve human development indicators which were measured by human development indices (HDI) (Regional Economic Outlook: Sub-Saharan Africa, April 2014).

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