Export Diversification And Economic Growth In Sub-Saharan Africa

Louis S. Hodey • Abena D. Oduro • Bernardin Senadza

Abstract

Most countries in Sub-Saharan Africa (SSA) have been associated with low and volatile growth performance over the years. Export diversification has been identified in the literature as growth-inducing. This study provides evidence on the relationship between export diversification and economic growth using panel data of forty-two (42) SSA countries. Employing the system Generalised Method of Moments (GMM) estimation technique and three different measures of diversification, we find that export diversification has a positive and significant effect on economic growth in SSA. Our results are robust to the measures of export diversification. The results do not however support a hump-shaped (non-linear) relationship between export diversification and economic growth in SSA. The findings have relevant implications for policy.

Key words  Export Diversification, Economic Growth, Sub-Saharan Africa, System GMM

JEL Classification  F13, F43, O47

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We gratefully acknowledge Augustin K. Fosu of the Institute of Statistical, Social and Economic Research (ISSER), University of Ghana, for very insightful comments on an earlier draft of the paper.
Introduction

Growth has been a major subject of concern for nations and researchers all over the world. The idea that export diversification (ED) induces economic growth is not alien to the development economics literature. In a broad sense, export diversification may be seen as a change in the composition of the existing export structure of an economy. Dennis and Shepherd (2007) look at export diversification as a process of widening the range of products that a country exports. It may also be referred to as the spread of a country’s production and exports over many sectors (Samen, 2010). There have been several debates in the literature in relation to whether developing countries should diversify their exports as a means of attaining higher economic growth and specialise in order to benefit from comparative advantage. The work of classical trade theorists, notably, Adam Smith and David Ricardo emphasised the role of specialisation for economic development. This idea is also favoured by the neoclassical economists.

The role of export diversification came to light largely through the widely cited works of Prebisch (1950) and Singer (1950) who questioned the pro-free trade views mainly held by the classical trade theorists and argue that because of the tendency of the terms of trade between primary and manufactured products to decline over time, specialisation is not in the best economic interest of developing countries. This assertion is based on the evidence that developing countries largely depend on the production and export of primary commodities. A further observation shows that specialisation mainly around primary commodities exposes countries to adverse external shocks, resulting in deteriorating terms of trade which subsequently slows down growth (Hesse, 2008). Hausmann and Klinger (2007) showed that a country’s export pattern is a good predictor of its future growth. They further stipulate that for a country to become rich, it needs to export “rich country” exports. This means that for developing countries to increase their incomes towards the level of the economically advanced countries, they must diversify their exports from primary commodities to manufactured goods, which are largely considered as “rich country” exports. Diversification into new primary export products or manufactured goods is generally viewed as a positive development. Its benefits include higher and more stable export earnings, job creation and learning effects, and the development of new skills and infrastructure that facilitate the development or discovery of new export products (Al-Marhubi, 2000).

The growth performance of Sub-Saharan African (SSA) countries has been low and volatile in the past but has exhibited greater resilience in the last decade or so. Sub-Saharan Africa is also identified as the world’s poorest inhabited continent. In the 1950s and 1960s when majority of countries gained political independence, SSA countries made some significant economic strides raising hopes for better economic performance in subsequent years. But this performance was short-lived; and as a result, the 1970s and 1980s have been labelled “the lost decades” of the region. Most countries in the region adopted the Economic Recovery Program (ERP) initiated by the World Bank and the International Monetary Fund (IMF) in the 1980s to reverse the worsening economic trends of countries in the region. The recovery process has been very slow, raising doubts about the efficacy of the ERP, with severe criticisms against the World Bank and IMF from many researchers especially from the sub-region. Economic performance of the region in recent times has been quite positive especially since the early 2000s. Though the economic prospects for Sub-Saharan Africa looks quite strong, growth in the region is still vulnerable to sharp declines in commodity prices (IMF, 2015).

Most Sub-Saharan African countries are still faced with the problems of volatile growth (see Figure 1) and high incidence of poverty over the years. Sub-Saharan Africa is considered the poorest region in the world and the only region where about half of its population live on
less than one dollar a day, with falling life expectancies (Yokoyama and Alemu, 2009). Figure 1 shows the trend in real GDP per capita and the export diversification index for SSA for the period 1995–2010.

It is observed from Figure 1 that SSA as a whole has not significantly diversified its exports over the period. Gross Domestic Product per capita growth rate has also been fluctuating, attaining negative values in 1998, 1999 and 2009. This volatility could be partly explained by the inability of SSA countries to diversify their exports over the years, since export diversification is generally considered as growth-smoothing in developing countries (Al-Marhubi, 2000). The point is made that the growth experiences of many developing countries, especially those in East Asia are partly associated with export diversification (Yokoyama and Alemu, 2009). The observation regarding SSA is that the economies in the region recorded low and volatile growth rates over the years but are yet to significantly diversify their exports. The question that therefore arises is whether export diversification in SSA would bring about economic growth as it did for East Asia. That is, export diversification has worked for East Asia; is it also likely to work for SSA?

The available theoretical and empirical literature suggests a hump-shaped relationship between export diversification and growth (Imbs and Wacziarg, 2003; Aditya and Roy, 2007; Hesse, 2008), meaning that export diversification would promote economic growth to a point, and beyond that point, it would slow down growth. The point beyond which export diversification slows the pace of growth is referred to as the Critical Diversification Index (CDI). Empirical testing of the hump-shaped relationship between diversification and growth for SSA has not received attention in the literature; hence the CDI for SSA remains unknown. Knowledge of the CDI for SSA would be useful for export diversification policy.

While a plethora of empirical studies have been undertaken over the years to explore the relationship between export diversification and growth, the findings have been inconclusive (see Al-Marhubi, 2000; Herzer and Nowak-Lehman, 2006; Agosin 2007; Lederman and Maloney, 2007, Imbs and Wacziarg, 2003; Klinger and Lederman, 2006; Aditya and Roy, 2007; Hesse, 2008; Yokoyama and Alemu, 2009).

The main objective of this study is to empirically investigate the relationship between export diversification and economic growth in Sub-Saharan Africa in the African context. The hypothesis of a hump-shaped relationship between export diversification and economic growth for SSA is also tested; and if such a relationship exists, the Critical Diversification Index (CDI) for SSA would be computed.

Aside from the observation that export diversification has not received much attention in SSA, the few studies in this area on SSA do not control for sub-regional disparities. Existing studies do not test the non-linear relationship between export diversification and economic growth. The contribution of the current study to the existing literature is four-fold. First, we use recent and comprehensive data, covering by far the highest number of countries in the region. Second, we test the hump shaped (non-linear) relationship between export diversification and growth. Third, we use three different measures of export diversification to ascertain the robustness of the results. Lastly, we control for sub-regional disparities among SSA countries.

The rest of the paper is organized as follows. The next section provides a survey of the existing literature, followed by a discussion of the methodology in Section 3. The results and discussion are presented in Section 4. Section 5 concludes with policy recommendations.

**Review of Related Literature**

As observed by Bebczuk and Berrettoni (2006), though the benefits of a diversified export base are well-known in the literature, there is no unified theoretical framework explaining
the driving forces of export diversification. Judging from the various theoretical perspectives on trade, export diversification and specialisation (concentration) appear, to represent two divergent views. Classical trade theories widely favour the view that countries should specialise in the production and export of commodities in which they have a comparative advantage. By specialising in the production and export of its comparative advantage good, a country allocates its resources more efficiently thereby improving its growth performance and welfare. Critics of this view are of the opinion that by specialising and exporting a narrow range of primary products, countries, especially those with low incomes may increase their degree of vulnerability to external shocks (Presbisch, 1950 and Singer, 1950). The trade-off between efficiency and vulnerability therefore becomes the point of departure. Further, it has been observed that the prediction that specialisation leads to efficiency hinges partly on the assumption that there exists no uncertainty in the production and exports of commodities (Osakwe, 2007). Evidence is available in the literature to the effect that in the presence of uncertainty and risk aversion, diversification may prove a better policy option than specialisation (Ruffin, 1974).

Yokoyama and Alemu (2009) however see export diversification as a means of widening a country’s comparative advantage. They cite three main theoretical arguments to underpin their assertion, namely, the traditional argument (Prebisch-Singer thesis), the endogenous growth theory, and the structural models of economic development.

The traditional argument suggests that less developed countries are exporters of a limited number of primary products which are highly vulnerable to international market demand. The instability in their export demand results in volatility of export earnings, adversely affecting national income and growth. Diversification of a country’s export portfolio thus offers the opportunity to smoothen export earnings in the face of unstable world market conditions, thereby leading to much more predictable incomes and growth.

From the perspective of the endogenous growth theory, aside the ability of export diversification to smoothen export earnings, it also has the capacity to bring about benefits in terms of new comparative advantages associated with the diversification of a country’s production structure. It is considered to widen the comparative advantage of developing countries from a few primary sectors to higher value production sectors which may result in better allocation of productive resources. It further argues that through backward and forward
linkages, new industries will be created through diversification of the production structure. Export diversification also generates new production technologies and managerial efficiencies through international competition, thereby leading to increasing returns to scale and spillover effects which ultimately affect growth in the long-run. In effect, export diversification enables countries to benefit from dynamic gains from trade as it leads to an expansion in the production possibility frontier of the exporting country.

The structural models of economic growth indicate that in order to attain meaningful sustainable growth, export diversification policies should be targeted at moving away from primary commodities towards manufactured goods. This is likely to generate backward and forward linkages which are capable of creating new industries and expanding existing ones (Chenery, 1979). The structural argument seems to suggest that vertical export diversification possesses greater ability to impact growth as compared to horizontal export diversification. This suggests that the content rather than the number of products in a country’s export basket is more critical to its economic growth.

The empirical literature, however, is inconclusive. While some studies provide evidence of a positive monotonic relationship between export diversification and economic growth (Al-Marhubi, 2000; Herzer and Nowak-Lehman, 2006; Agosin 2007; Lederman and Maloney, 2007), others reveal a non-monotonic (hump-shaped) relationship between export diversification and economic growth (Imbs and Wacziarg, 2003; Klinger and Lederman, 2006; Aditya and Roy, 2007; Hesse, 2008). This apparently mixed evidence in the empirical literature regarding the nature of relationship between export diversification and growth calls for further studies. The literature on the relationship between export diversification and growth is also sparse for SSA. This paper contributes to the existing literature by investigating this relationship in the context of SSA.

Methodology

To analyse the effect of export diversification on economic growth, a dynamic panel growth regression model is estimated from the human capital augmented Solow growth model by Mankiw et al (1992). According to this model, growth of output per worker is a function of the initial output per worker, the initial level of technology, the rate of technological progress, rate of depreciation, rate of savings, and human capital accumulation. This study adopts the dynamic panel growth framework in order to account for temporal autocorrelation, reduce the level of potential spurious regression which may lead to inaccurate inferences and inconsistent estimates. The lagged dependent variable is introduced as a regressor in order to capture the lagged effects (persistence) of the dependent variable.

The dynamic panel growth model is specified as:

\[ y_{it} = \alpha y_{i,t-1} + x_i \beta + \epsilon_{it} \]  

By decomposing the error term in equation (1) into two components, \( \epsilon_{it} = \mu_i + \nu_i \) where the first component measures the unobserved country-specific effects and the second component is the idiosyncratic error term. Equation (1) can therefore be re-written as:

\[ y_{it} = \alpha y_{i,t-1} + x_i \beta + \epsilon_{it} + \mu_i + \nu_i \]  

Where \( i \) indexes the countries under study, \( t \) denotes the years, \( y_{it} \) is the dependent variable, \( y_{i,t-1} \) is the lagged dependent variable, is a matrix of all explanatory variables, \( \mu_i \) is an unobserved country-specific time-invariant effect, and \( \nu_i \) is the idiosyncratic error term.
Apart from the main variable of interest (export diversification), economic theory and empirical evidence inform the choice of the other explanatory variables. They include, initial real GDP per capita, human capital, physical capital, population growth, foreign direct investment (FDI).

Following Yokohama and Alemu (2009) with few modifications, the model for empirical estimation is stated as:

\[
\begin{align*}
\text{RGDPPCG} \left( t \right) &= \alpha_0 \text{RGDPPCG} \left( t - 1 \right) + \alpha_2 \text{GFCF} \left( t \right) + \alpha_3 E \left( t \right) + \alpha_4 \text{ED} \left( t \right) + \\
&\quad + \alpha_5 \text{POP} \left( t \right) + \alpha_6 \text{ENRO} + \alpha_7 \text{FDI} \left( t \right) + \alpha_8 \left( \sum_{i=1}^{4} \text{ED} \left( t \right) \right) * D_i + \vartheta_{i,t} \tag{3}
\end{align*}
\]

Where \( \text{RGDPPCG} \left( t \right) \) is real GDP per capita growth; \( \text{RGDPPCG} \left( t - 1 \right) \) is initial real GDP per capita; \( \text{GFCF} \left( t \right) \) is gross fixed capital formation (to proxy for domestic physical capital or domestic investment); \( E \left( t \right) \) represents three measures of export diversification (export product diversification index, export product concentration index, and number of export products); \( \text{ED} \left( t \right) \) is the squared term of the index of export diversification; \( \text{POP} \left( t \right) \) is population growth rate; \( \text{ENRO} \) is gross secondary school enrolment rate (a proxy for human capital); \( \text{FDI} \left( t \right) \) is foreign direct investment as a percentage of GDP; \( D_i \) is regional dummy for four regional blocks (East, Middle, Southern and West Africa sub-regions); \( \text{ED} \left( t \right) * D_i \) is the interaction term of export diversification index and the regional dummies; and \( \vartheta_{i,t} \) is the idiosyncratic error term.

With exception to the regional dummies \( (D_i) \) and real GDP per capita growth, natural logarithms are taken for all the variables in the regression model. Data for all the variables are sourced from the World Bank’s African Development Indicators (ADI) Online Database (World Bank, 2015).

The Critical Diversification Index (CDI) is derived by setting the partial derivative of real GDP per capita with respect to the index of export diversification to zero from equation (3). The CDI indicates the point at which turn around in real GDP per capita occurs in relation to export diversification.

Hence

\[
\frac{\partial \text{RGDPPCG} \left( t \right)}{\partial \text{ED} \left( t \right)} = \alpha_2 + 2 \alpha_4 \text{ED} \left( t \right) + \alpha_6 \sum_{i=1}^{4} D_i = 0
\]

This gives

\[
\text{ED}^* \left( t \right) = \frac{-\alpha_3 - \alpha_5 \sum_{i=1}^{4} D_i}{2 \alpha_4} > 0 \tag{4}
\]

This is the expected case when the export product diversification index and the number of export products are used as measures of export diversification. On the other hand, when the export product concentration index is used, we expect:

\[
\text{ED}^* \left( t \right) = \frac{-\alpha_3 - \alpha_5 \sum_{i=1}^{4} D_i}{2 \alpha_4} < 0 \tag{5}
\]

Equations (4) and (5) give the Critical Diversification Index to be computed if evidence of a hump-shaped relationship between the measures of export diversification and economic growth is found.

The second-order condition is satisfied in the optimization process above if

\[
\frac{\partial^2 \text{RGDPPCG} \left( t \right)}{\partial \text{ED} \left( t \right)^2} = 2 \alpha_4 < 0.
\]
The export product diversification index is measured using the Absolute Deviation of Country Commodity Shares, which is widely used by UNCTAD and employed by Al-Marhubi (2000). It measures the extent of the difference between the structures of trade of a particular country and the world average. The index signals whether the structure of exports of a given country or group of countries differs from the export structure of the world. It is given by the formula:

\[
ED^*_it = \frac{\Sigma_{i} h_{ij} / h_{i} / 2}{E}
\]

Where \(ED^*_j\) is the export product diversification index of country \(j\), \(h_{ij}\) is the share of commodity \(i\) in total exports of country \(j\) and \(h_{i}\) is the share of commodity \(i\) in world exports. The export product diversification index ranges from 0 (for less diversified exports) to 1 (for more diversified exports).

The export product concentration index is another commonly used measure of diversification in the literature. It reflects the Herfindahl-Hirschmann index measure of the degree of export concentration within a country. The index is defined as the square root of the sum of the squared shares of exports of each industry in total exports. The index takes values between 0 and 1, inclusive; with 1 indicating that only a single product is exported. Higher values indicate that exports are concentrated in fewer sectors, while values closer to 0 reflect a more diversified export base.

The number of export products measures the number of products (at SITC, Revision 3, 3-digit group level) exported by country or country grouping; this figure includes only those products whose export values are greater than 100,000 dollars or more than 0.3 percent of the country’s or country group’s total exports. The maximum number of products is 261.

The dynamic panel model in equation (3) is estimated using the system General Method of Moments (GMM) estimation technique. The system GMM procedure is best suited for dynamic panel models because it resolves the dynamic panel bias problem resulting from endogeneity associated with models which have lagged terms of the dependent variable as explanatory variables. According to Roodman (2006), the system GMM estimator is superior to the other estimators in the analysis of dynamic panel models. Caselli et al. (1996), also notes that by using the system GMM estimation technique, biases resulting from omitted variables, endogeneity of explanatory variables, and the presence of measurement error are minimized.

Arellano and Bond (1991) assert that the consistency of the GMM estimator essentially depends on the assumptions that the error terms do not exhibit second order serial correlation and that the instruments are valid (see also Blundell and Bond, 1998). To test whether the instruments are valid, the Arellano-Bond serial correlation test and a Sargan test for over-identifying restrictions are conducted. Failure to reject the null hypotheses of these tests implies that the instruments are valid. A unit root test is also conducted to check whether the series are stationary. This study adopts the Fisher test for stationarity. The Fisher test may be preferred to other tests because, (i) it does not require a balanced panel as in the case of the Im, Pesaran and Shin (IPS) test; (ii) different lag lengths can be used in the individual Augmented Dickey Fuller (ADF) regressions; (iii) it is compatible with the use of any unit root test; and (iv) it does not require simulating adjustment factors that are specific to the sample size and specification (Maddala and Kim, 1998; Baltagi, 2008).

Essentially, the system GMM\(^1\) is preferred to the other estimation techniques for this study because, 1) it overcomes the problem of endogeneity through the use of lagged values of

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\(^1\) For an extensive reading on the system GMM estimation technique see Roodman (2006); Agosin (2007); and Hesse (2008) among others.
explanatory variables as instruments; 2) it minimizes the problem of information loss in cross-sectional regressions as it allows for multiple observations for each country across time; 3) it allows for the use of level and lagged values of the variables in the estimation equation; and 4) it gives consistent estimates even when T (time periods in years) is small and N (countries) is large.

Results and Discussion

The descriptive statistics in Table 1 show that over the period 1995–2010, the average real per capita GDP of SSA was US$1,047.6. It ranges from a low of US$54.5 to a high of US$8,787.8, implying a wide income disparity gap between the poorest and the richest countries in the SSA region over the period. The average real GDP per capita growth for the period is 2.7 percent.

The average export product diversification index for the region over the period is 0.77; an indication that at least, SSA countries have made some efforts at diversifying their exports (see Table 1). The average export product concentration index is 0.47, signifying a moderately high level of concentration of SSA exports around a relatively few products. The number of export products of the region averaged 145 products. This number could however be attributed to an increase in the number of primary exports, which may not necessarily bring much gains to countries in the sub-region as compared to manufactured exports (Yokoyama and Alemu, 2009). The regression results are shown in Table 2.

Model 1 results involve all the explanatory variables with exception to the regional dummies and the interacted variables. In model 2, the regional dummies are introduced. The third model includes interactions of export diversification with the four regional dummies. The regional dummies, export diversification and the squared term of export diversification were not included in model 3 because of severe collinearity with the interacted variables (ED*MDUMMY, ED*SDUMMY and ED*WDUMMY).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min.</th>
<th>Max.</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP per capita growth (annual %)</td>
<td>2.7</td>
<td>7.3</td>
<td>-33.8</td>
<td>92.6</td>
<td>N/A</td>
</tr>
<tr>
<td>Real GDP per capita (US$)</td>
<td>1,047.6</td>
<td>1,644.9</td>
<td>54.5</td>
<td>8,787.80</td>
<td>-</td>
</tr>
<tr>
<td>Gross Fixed Capital Formation (% GDP)</td>
<td>20.7</td>
<td>11.2</td>
<td>2.0</td>
<td>113.6</td>
<td>+</td>
</tr>
<tr>
<td>Export Product Diversification Index</td>
<td>0.77</td>
<td>0.07</td>
<td>0.38</td>
<td>0.92</td>
<td>+</td>
</tr>
<tr>
<td>Export Product Concentration Index</td>
<td>0.47</td>
<td>0.21</td>
<td>0.06</td>
<td>0.97</td>
<td>-</td>
</tr>
<tr>
<td>Number of Export Products</td>
<td>145.0</td>
<td>77.6</td>
<td>6.0</td>
<td>260.0</td>
<td>+</td>
</tr>
<tr>
<td>Population growth (annual %)</td>
<td>2.4</td>
<td>1</td>
<td>-1.4</td>
<td>9.8</td>
<td>+/-</td>
</tr>
<tr>
<td>Enrolment (gross secondary school %)</td>
<td>37.3</td>
<td>25.7</td>
<td>5.2</td>
<td>122.9</td>
<td>+</td>
</tr>
<tr>
<td>FDI (net inflows % GDP)</td>
<td>5.3</td>
<td>13.1</td>
<td>-82.9</td>
<td>145.2</td>
<td>+/-</td>
</tr>
</tbody>
</table>

Source: Authors’ computations
Table 2  System GMM estimates (Two Step Results) based on the Augmented Solow Growth Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>ED1</th>
<th>ED2</th>
<th>ED3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Export Product Diversification (ED1)</td>
<td>0.250***</td>
<td>0.760***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.266)</td>
<td>(0.482)</td>
<td></td>
</tr>
<tr>
<td>Export Diversification Squared (ED1 squared)</td>
<td>-0.291</td>
<td>0.016</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.178)</td>
<td>(0.289)</td>
<td></td>
</tr>
<tr>
<td>Export Product Concentration (ED2)</td>
<td></td>
<td>-2.240**</td>
<td>-2.677**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.981)</td>
<td>(1.028)</td>
</tr>
<tr>
<td>Export Concentration Squared (ED2 squared)</td>
<td></td>
<td>0.773</td>
<td>-0.045</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.962)</td>
<td>(1.013)</td>
</tr>
<tr>
<td>Number of Exports (ED3)</td>
<td></td>
<td></td>
<td>0.340**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.136)</td>
</tr>
<tr>
<td>Number of Exports Squared (ED3 squared)</td>
<td></td>
<td></td>
<td>0.065</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.070)</td>
</tr>
<tr>
<td>Initial Real GDP per Capita (Constant 2000 US$)</td>
<td>0.022</td>
<td>-0.060***</td>
<td>-0.020**</td>
</tr>
<tr>
<td>Variable</td>
<td>ED1</td>
<td>ED2</td>
<td>ED3</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>(0.016) (0.020) (0.009) (0.201) (0.306) (0.283) (0.210) (0.307) (0.283)</td>
<td>(0.052) (0.299) (0.150) (0.414) (0.431) (0.416) (0.419) (0.420) (0.416)</td>
<td>(0.087) (0.172) (0.132) (0.176) (0.240) (0.218) (0.170) (0.233) (0.218)</td>
</tr>
<tr>
<td>Gross Fixed Capital Formation (% GDP)</td>
<td>0.338***</td>
<td>-0.147</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>(0.052)</td>
<td>(0.299)</td>
<td>(0.150)</td>
</tr>
<tr>
<td>Population Growth (Annual %)</td>
<td>-0.192**</td>
<td>-0.755***</td>
<td>-0.473***</td>
</tr>
<tr>
<td></td>
<td>(0.087)</td>
<td>(0.172)</td>
<td>(0.132)</td>
</tr>
<tr>
<td>Enrolment (Gross Secondary School %)</td>
<td>0.166***</td>
<td>1.009***</td>
<td>0.554***</td>
</tr>
<tr>
<td></td>
<td>(0.043)</td>
<td>(0.255)</td>
<td>(0.125)</td>
</tr>
<tr>
<td>FDI (Net inflows % GDP)</td>
<td>0.020</td>
<td>0.049</td>
<td>-0.007</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.043)</td>
<td>(0.038)</td>
</tr>
<tr>
<td>Middle Africa Dummy (MDUMMY)</td>
<td>-2.088***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.267)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Africa Dummy (SDUMMY)</td>
<td>-2.770**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.363)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Africa Dummy (WDUMMY)</td>
<td>0.408</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.372)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2 continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>ED1</th>
<th>ED2</th>
<th>ED3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>ED*MDUMMY</td>
<td>0.619***</td>
<td>-0.313</td>
<td>-0.313</td>
</tr>
<tr>
<td></td>
<td>(1.095)</td>
<td>(0.504)</td>
<td>(0.504)</td>
</tr>
<tr>
<td>ED*SDUMMY</td>
<td>0.517***</td>
<td>-1.639*</td>
<td>-1.639*</td>
</tr>
<tr>
<td></td>
<td>(0.236)</td>
<td>(0.987)</td>
<td>(0.987)</td>
</tr>
<tr>
<td>ED*WDUMMY</td>
<td>-1.731***</td>
<td>-0.383</td>
<td>-0.383</td>
</tr>
<tr>
<td></td>
<td>(0.572)</td>
<td>(0.497)</td>
<td>(0.497)</td>
</tr>
<tr>
<td>Wald Chi-squared</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>(Prob &gt; Chi-squared)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td>229</td>
<td>229</td>
<td>229</td>
</tr>
<tr>
<td>Arellano-Bond [AR(2), Prob &gt; Z]</td>
<td>0.378</td>
<td>0.770</td>
<td>0.810</td>
</tr>
<tr>
<td>Sargan test (Prob &gt; Chi-squared)</td>
<td>0.388</td>
<td>0.631</td>
<td>0.703</td>
</tr>
</tbody>
</table>

Note: The dependent variable is real GDP per capita growth. Figures in parenthesis are the standard errors of the estimates; ***, ** and * refer to statistical significance of the estimates at 1%, 5% and 10% respectively.

Source: Authors’ computation
The Wald Chi-squared statistic for all the regressions shows that the explanatory variables are jointly significant (Table 2). The Arellano-Bond test AR (2) in first differences fails to reject the null hypothesis of no two-period serial correlation in the residuals. Also, the Sargan test for overidentifying restrictions shows that the overidentifying-restrictions are valid in the model; hence the model is not weakened by too many instruments. The test results favour the fixed-effects model which is a requirement for the use of the system GMM estimation procedure. The other diagnostic tests, namely, autocorrelation, heteroscedasticity, and overidentifying restrictions yield results that are favorable for the use of the system GMM estimation technique. These results indicate that the system GMM estimation technique is appropriate for the estimations and its estimates are reliable. We tested for unit root in the variables to avoid spurious regressions. The results indicate that the panels are not associated with unit roots hence there is no tendency for any possible spurious or unrelated regressions.

In conformity with a priori expectations, the coefficient of the export diversification index (ED1) is positive (Table 2). The coefficients in models 1 and 2 suggest that a one percentage point increase in the export diversification index of a country in SSA relative to the world mean will cause a further growth of about 0.3 percent and 0.8 percent, respectively. This finding confirms previous studies, for example, Al-Marhubi (2000); Hesse (2008); Yokoyama and Alemu (2009) as well as some other cross-country studies such as Agosin (2007) and Imbs and Wacziarg (2003) on export diversification and economic growth. This result suggests that for Sub-Saharan Africa, countries which intensify their export diversification efforts are likely to experience a faster growth than those with low levels of export diversification. The coefficient for export concentration index (ED2) in Table 2 is negative as expected and corroborates the results in Hesse (2008) who also used this same measure of diversification. Consistent with the results in Al-Marhubi (2000), the coefficient on the number of export products (ED3) is positive, indicating that as the number of export products increase, countries in SSA are expected to grow faster (see Table 2).

The squared terms of export diversification are not significant (Models 1, 2, 4, 5, 7 and 8), implying no evidence of a hump-shaped (concave) relationship between export diversification and economic growth in SSA. This finding does not synchronize with that of Imbs and Wacziarg (2003) and Hesse (2008) who find some evidence of nonlinearity between export diversification and economic growth using cross-country data. The implication of our finding is that countries in SSA have not diversified to the level where further diversification may retard growth; hence further diversification is desirable.

The regional dummies are introduced in model 2. East Africa\(^2\) is used as reference. The regional dummies account for some of the aggregate growth effects not captured by the other explanatory variables in the model. The results indicate that the aggregate growth effect is lower in middle and southern Africa. The measure of export diversification index is interacted with the regional dummies in regression model 3 in order to determine whether the effect of export diversification on growth is the same for all the sub-regions in SSA. The coefficients of the interacted variables are significant, implying that the effect of ED on growth is not the same for the sub-regions. The results show that compared to East Africa, the effect of ED on growth is higher for countries in Middle and Southern Africa countries. On the contrary, the effect of ED on growth is lower in West Africa as compared to East Africa. The coefficient of the first interacted variable (ED*MDUMMY) in model (3) suggests that a one percentage increase in the export diversification index in the Central Africa region would result in about 0.6 percent higher growth relative to East Africa.

\(^2\) East Africa is chosen as reference as it performed fairly better than the other regions in terms of real GDP per capita growth and export diversification over the period of the study.
Table 3  Fisher-Type Stationarity (Unit Root) Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Inverse chi-squared</th>
<th>Inverse normal</th>
<th>Inverse logit t</th>
<th>Modified inv. chi-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Prob</td>
<td>Statistic</td>
<td>Prob</td>
</tr>
<tr>
<td>GDP/Capita Growth</td>
<td>288.5</td>
<td>0.000</td>
<td>-11.3</td>
<td>0.000</td>
</tr>
<tr>
<td>Gross Fixed Capital–Formation</td>
<td>188.9</td>
<td>0.000</td>
<td>-6.7</td>
<td>0.000</td>
</tr>
<tr>
<td>Export Product Diversification (ED1)</td>
<td>243.8</td>
<td>0.000</td>
<td>-9.6</td>
<td>0.000</td>
</tr>
<tr>
<td>ED1 Squared</td>
<td>242.9</td>
<td>0.000</td>
<td>-9.6</td>
<td>0.000</td>
</tr>
<tr>
<td>Export Product Concentration (ED2)</td>
<td>284.0</td>
<td>0.000</td>
<td>-11.2</td>
<td>0.000</td>
</tr>
<tr>
<td>ED2 Squared</td>
<td>292.1</td>
<td>0.000</td>
<td>-11.6</td>
<td>0.000</td>
</tr>
<tr>
<td>Number of Export Products (ED3)</td>
<td>434.9</td>
<td>0.000</td>
<td>-15.9</td>
<td>0.000</td>
</tr>
<tr>
<td>ED3 Squared</td>
<td>432.8</td>
<td>0.000</td>
<td>-15.8</td>
<td>0.000</td>
</tr>
<tr>
<td>Population Growth</td>
<td>294.2</td>
<td>0.000</td>
<td>-10.2</td>
<td>0.000</td>
</tr>
<tr>
<td>Enrolment</td>
<td>64.4</td>
<td>0.083</td>
<td>-0.9</td>
<td>0.063</td>
</tr>
<tr>
<td>FDI</td>
<td>249.4</td>
<td>0.000</td>
<td>-9.6</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Authors’ computation.
The initial real GDP per capita has a negative and statistically significant coefficient. This indicates that countries with lower initial real GDP per capita have the tendency to grow faster than those with higher initial real GDP per capita. This result is in line with the theoretical predictions of the growth convergence theory which predicts that income per capita of countries would converge over time. It also confirms the findings of other previous studies such as Hesse (2008) and Al-Marhubi (2000) but contradicts the findings of Yokoyama and Alemu (2009). The coefficients on standard growth correlates, namely, physical capital, population, and human capital have the expected signs and are statistically significant in conformity with other studies.

Conclusions and Policy Implications

The growth performance of Sub-Saharan Africa (SSA) countries has been an issue of concern for many individuals, governments, organisations and researchers over the years. Yet export diversification has been identified in the literature as growth-inducing. This paper sought to assess the effect of export diversification on economic growth in SSA. The results show a positive relationship between export diversification and economic growth in SSA. There is, however, no evidence of existence of a humped-shaped relationship between export diversification and economic growth. The evidence of a monotonic relationship between export diversification and economic growth in SSA implies that for countries in the region, further diversification would propel the pace of growth.

The recent forecasted slowdown in SSA growth by the IMF arising from falling commodity prices, particularly, oil prices is cause for concern. Sub-Saharan African countries, the majority of whom depend on the export of a few primary commodities are, therefore, prone to growth shocks when world prices plummet. Our findings, however, point to how the diversification of exports could lead to sustained economic growth. Thus, SSA countries would benefit from encouraging more rapid economic diversification, in particular by addressing major outstanding bottlenecks to private sector activity and improving their business environment (IMF, 2015).

Diversification could be promoted through the implementation of entrepreneurship support schemes and the creation of favorable investment climate to encourage investment in new production sectors, and also expand existing export sectors.

Export diversification can be promoted through trade facilitation measures which reduce trade costs. Administrative bottlenecks which take the form of domestic entry barriers, trade restrictions, high costs and delays in business registration should be curtailed. Governments in SSA should also initiate policies targeted at promoting research into new production sectors, especially high value-chain agricultural activities so as to command higher and stable prices on the international market and also ensure sustained foreign exchange earnings.

Export diversification can also occur through learning-by-doing and learning-by-exporting as well as through imitation of the production activities of developed economies (Guiterez de Pineres and Ferrantino, 1997). This is an area governments of SSA countries should give greater attention to in order to trigger export diversification and accelerate the overall economic progress in the region.

Equally important is enhancing investment in human capital in the form of education and skills training. Also, African governments’ efforts to reduce restrictions of their exports to developed countries, such as the European Union’s standards for African food exports, could help promote export diversification. As noted by Yokoyama and Alemu (2009), however, export diversification is just one of the key policy measures to be undertaken for structural
transformation and economic growth. It should not be embraced as a panacea for the varied economic problems faced by Sub-Saharan African countries.

References


