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Foreign Trade and Economic Growth in sub-Saharan African Countries: Dynamic Common Correlated Effects Estimator (CS-ARDL)

Shuaibu Sidi Safiyanu* and Soo Yean Chua

Economics Programme, School of Social Sciences, Universiti Sains Malaysia, 11800 Penang, Malaysia

ABSTRACT

This paper investigates the short-run and long-run dynamics between foreign trade and economic growth in 40 sub-Saharan African countries over the period of 1992-2018. It utilized Cross-sectional Augmented Autoregressive Distributed Lag (CS-ARDL) panel data estimations to handle cross-sectional dependency and dynamic heterogeneity of the countries under investigation. The empirical result shows that foreign trade significantly increased the economic growth of sub-Saharan African countries in the short-run but had a significant negative effect on economic growth in the long-run. The results also confirm that total trade, imports, exports, and trade balance Granger caused economic growth in sub-Saharan African countries. For sub-Saharan Africa trade to have a larger effect on economic growth, countries need to modify their structures of a trade by diverting from exports of raw materials to high value-added goods. Moreover, trade policy measures should be directed towards the promotion of investments in capital intensive sectors and human capital development that can absorb technological improvement from advanced countries.

Keywords: Economic growth, foreign trade, panel data, sub-Saharan Africa

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E-mail addresses:
sssafiyanu78@gmail.com (Shuaibu Sidi Safiyanu)
sychua@usm.my (Soo Yean Chua)
*Corresponding author

INTRODUCTION

The achievement of sustainable economic growth is the most significant priority of any country, especially in developing countries. Many of these countries have struggled to attain rapid economic growth. Recently foreign trade has been recognized as a vital factor that determines growth in the world. The contribution of trade in the economic

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growth of developing and advanced countries cannot be overemphasized. Institutions like the World Trade Organization (WTO) and International Monetary Fund (IMF) are consistently encouraging countries particularly developing nations to accelerate growth processes through trade liberalization in order to acquire a desire growth rate (Tahir & Norulazidah, 2013).

Foreign trade is an important component of the gross domestic product (GDP) particularly in developed and emerging countries, which increases the economic growth of a country. Foreign trade has gained considerable recognition in the literature because trade propels nations and the world economy as a whole. Theory of foreign trade suggests that trade openness contributes positively to the economic growth of a country through gains from economies of scale especially in small countries (Helpman & Krugman, 1985); encouraged competition through efficiency (Balassa, 1978); and stimulating the transfer of knowledge (Grossman & Helpman, 1991). Therefore, GDP and export relationship are bi-directional as argued by Islam (1998) and Love and Chandra (2004).

African economies are dependent on foreign trade and this reliance has significantly increased in the last few decades. Foreign trade is an essential source of foreign exchange required for the importation of intermediate goods needed for domestic productions. Foreign trade also provides access to new technology, provides varieties of consumer goods, and the capacity to increase productivity, employment, and economic growth. African countries dependence on trade increases nowadays because of the following factors: Improvement in information and communication technology; reduction in tariffs and other non-tariffs barriers; shift in the world paradigm from protectionism to liberalization as a strategy of development to trade as an engine of growth; and the significant roles of developing economies in the world economy. Improvement of trade balance in Africa as a result of the commodity price boom over the past few decades boosted African capacity to export and import (United Nation Conference of Trade and Development [UNCTAD], 2016).

In spite of the importance of trade to the economic growth of a country, African trade in relation to other continents of the world is not impressive. World merchandise exports increased in 2014 after the world financial crisis, but it was reversed the following year and Africa's economies encountered slowdown compared to other continents. In 2015 and 2016 Africa's exports fell by 29.6% and 11.5% respectively, compared to 12 % and 4.5 % in Asia, 10.9% and 3.7% in America, and 14% and 1.3% in Europe. This unprecedented decline is mostly triggered by the 2014–2015 collapse of the world commodity prices, particularly oil prices. Comparatively to the world exports Africa's percentage decline in 2014 from 2.9% to 2.2% in 2016 (United Nations, 2017).

Africa's merchandise imports fell also (though not as much compared to a decrease in the trade deficit), attributed to a fall in commodity-related incomes,

domestic currencies depreciation, and low investment capacity. This situation accounts for a fall in merchandise imports in Africa from US$642.2 billion to USD$500.8 billion in 2014 and 2016 respectively. However, the export volume fell significantly much more than imports, which contributed significantly to Africa's trade deficit. The trade balance in Africa shifted from a surplus of US$24.0 billion in 2012, to a deficit of US$86.9 billion in 2014 and US$154.9 billion in 2016 (United Nations, 2017). Generally, import portrays the country's weakness in attaining self-sufficiency and reliant on other countries to survive. Unlike exports, too much importation worsens the country's foreign exchange and trade balance, which translates to lower economic growth. However, in some circumstances, the import is regarded as a growth-enhancing factor, particularly the importation of capital goods that aid productivity.

Foreign trade enables goods, services, and factors of production to move across international boundaries and became a substantial driver of economic growth and development of countries (UNCTAD, 2014). Given the importance of foreign trade in accelerating the growth of countries, the majority of academicians and policymakers maintained that openness to trade is superior to autarky as openness is crucial to lowering poverty and inflation. It also has the capacity to enhance employment opportunities; quality health care system and good education (Wynne & Kersting, 2007). A significant number of theoretical and empirical literature such as Chen (2009), Wacziarg and Welch (2008), and Were (2015) has supported the assertion that foreign trade impacts positively on economic growth and development of nations. However, the dilemma is that not all nations gain sufficiently from the benefits of trade.

It is notable to highlight from this point whether a nation benefits from foreign trade depends on the country's individual characteristics. Some of these characteristics are lack of export diversification, deficient institutional quality, and inappropriate execution of policies. Although these features contributing to low growth rate, UNCTAD (2005) ascribed a lack of focus by decision-makers as a notable factor responsible for low gains from trade, particularly, sub-Saharan African countries. Consequently, unless good policies are implemented to enable a favorable atmosphere for these features to work effectively, the gains of trade will still be insignificant. Given this assertion, most of the African countries over the years have lagged in achieving high growth through foreign trade.

This paper evaluates the dynamics between foreign trade and economic growth in selected 40 sub-Saharan African countries using recent panel data techniques.[1] We also used multiple trade dimensions (export, import, total trade, and trade balance) to examine the impact of trade on growth. The results uncover a positive significant impact of trade on economic growth in the short-run. However, in the case of the long-

1 See Appendix 1 for the list of selected 40 sub-Saharan countries

run, the effect is negative. The remaining sections of the paper are presented as follows: section two briefly reviews the literature and section three discusses the data, theoretical framework, and model specifications. Section four highlights the results and analysis, and conclusions are presented in the last section.

LITERATURE REVIEW

There is a common belief that foreign trade contributes to economic growth positively. This can be found in several literatures on the growth-trade relationship, as well as the growth episodes experienced across different countries in the globe for the past decades. From the early studies, Michaely (1977) utilized simple correlation techniques in the study of 41 developing economies and found a strong positive relationship between foreign trade and economic growth. He concluded that the protectionist import substitution industrialization policies had negative effects on growth. In another study, Balassa (1978) used regression techniques and found a positive correlation relationship between foreign trade and economic growth for a sample of 10 countries. Yanikkaya (2003) studied the effect of trade openness on the economic growth of 120 countries from 1970 to 1997 using trade restriction on foreign exchange and volume of trade as a share of GDP (exports + imports) as indicators of trade openness. The empirical findings show that both trade indicators have a positive impact through the improvement in total factor productivity on economic growth.

Recent empirical studies have reported mixed findings, some reports a positive relationship between foreign trade and economic growth (Jouini, 2015; Kim, 2011), others empirical findings documented no relationship or even a negative relationship (Musila & Yiheyis, 2015; Ulaşan, 2015). Several studies carried out in sub-Saharan Africa have found evidence of mixed results as well. Asfaw (2014) investigated the effect of trade liberalization on the economic growth of 47 sub-Saharan African countries. He found that openness to trade stimulated economic growth and investment within the period under study. Moreover, trade policy variables such as real effective exchange rate and average weighted tariff rate affected economic performance through trade. Furthermore, in a study of 41 sub-Saharan African countries Brueckner and Lederman (2015) used instrumental variables in panel estimations. They observed that trade openness influenced economic growth positively in the short-run and long-run.

Contrary to the previous literature, Gries et al. (2009) examined 16 selected sub-Saharan African countries and found insignificant relationships among the variables in the long-run. Furthermore, their result showed that economic growth propeled openness to trade in Gabon, Senegal, Mauritius, Ethiopia, Togo, Kenya, and Sierra Leone while bi-directional causation was evinced in Cameroon, Cote d'Ivoire, Rwanda, and Nigeria. Finally, there was no causality between trade and growth in South Africa, Ghana, Gambia, Burundi, and Madagascar. A similar study

conducted by Vlastou (2010) using 34 selected African countries confirmed that trade openness exerted a negative effect on economic growth. He further identified a causality running from trade to economic growth. Likewise, Tekin (2012) investigated 27 least developed countries in Africa. He reported no significant causation running from foreign aid, trade openness, and real GDP per capita. Furthermore, Lawal et al. (2016) study the trade-growth relationship in Nigeria using ARDL estimation techniques. They reported a short-run positive impact of openness on growth, but a long-run negative impact was identified.

Employing instrumental variable threshold regression model, Kim and Lin (2009) used cross-country data of 61 countries from 1960 to 2005 and initial real per capita income as the threshold variable, they found significant threshold effects on trade-growth relationship. A high degree of trade openness has positive impacts on economic growth for high-income countries while a negative impact on the economic growth of low-income countries. The beneficial impact of trade liberalization seems to increase as the economy of such a country improves, confirming the arguments about the adoptive capacity of a country in the diffusion of knowledge and technology advancement. Similarly, a panel data of 66 developing economies had been utilized by Eris and Ulasan (2013) to examine the effects of trade openness on long-run economic growth from 1960 to 2000. The study employed the Bayesian model averaging technique to take consideration of model uncertainty. The results confirmed no evidence of a positive correlation between openness and long-run economic growth. The findings further show that macroeconomic uncertainties and economic institutions are correlated to inflation and long-run economic growth is determined by government expenditure in the countries selected.

Using panel data estimations, Kilic and Beser (2017) examined the causal relationship between trade-growth nexus in five Eurasian countries spinning from 1992-2015. The result of the cross-sectional dependency test revealed that there was a presence of cross-section dependency. The Konya (2006) causality test result shows feedback causation between GDP growth to exports and one-way causation between GDP growths to imports.[2] A similar study conducted by Dinç et al. (2017) examined the impact of foreign trade on economic growth in seven developing countries including Iran and Turkey utilizing panel data technique. The result showed that foreign trade, physical resources, and energy consumption had a significant positive impact on economic growth. Likewise, Idris et al. (2016) examined trade openness and economic growth in 87 Organization for Economic Co-operation and Development (OECD) and developing countries over a period of 1977-2011 using a dynamic panel estimation method. The results revealed a bidirectional causal relationship for both OECD and developing countries. The finding is also consistent with the

2 See Konya (2006) for the discussion on Konya bootstrap panel Granger causality.

endogenous model that an increase in trade openness will increase economic growth. Furthermore, Mputu (2016) investigated the link between terms of trade, trade openness, and economic growth in 13 sub-Saharan African countries using the popular fixed and random effects model for the period 1980-2011. The findings revealed a positive and statistically significant relationship between terms of trade and GDP. This means that for every unit of goods exported, it can purchase more units of imports from its trading partners. However, the coefficient of trade openness is negatively related to GDP and it is harming the region instead of benefiting it.

Zahonogo (2017) used the recent pooled mean group estimation technique to examine trade and economic growth in 42 sub-Saharan African countries from 1980-2012. The findings revealed that trade openness was the main driver of growth over a long period of time. In a recent study, using ordinary least square techniques, Roquez-Diaz and Escot (2017) examined the impact of trade openness on economic growth in 18 Latin American countries using causality tests in heterogeneous panel spinning from 1990 to 2013. The study utilized second generation panel data estimation techniques such as cross-section dependence, panel unit root test, panel cointegration test, and Dumitrescu and Hurlin (2012) causality test.[3] The empirical results rejected the hypothesis of general, unidirectional, and the homogeneous association between openness and growth using aggregated data. The evidence of causal relation from trade liberalization to economic growth in Peru, Chile, Uruguay, and Nicaragua was found while bidirectional causality in Honduras and Mexico. Causality runs from growth to trade liberalization in Costa Rica, Colombia, Dominican Republic, and Guatemala.

Most recently, Manwa et al. (2019) investigated trade liberalization and economic growth of five Southern African Customs Union (SACU) economies using panel data from 1980 to 2013. The SACU countries are Namibia, Swaziland, South Africa, Botswana, and Lesotho. The study used four trade liberalization indicators; trade ratios, REER, adjusted trade ratios, and tariffs. The fixed effect regression results revealed a weak indication that trade liberalization had a little positive impact on SACU growth.

This study plans to fill the gap in the literature by examining the impact of foreign trade on economic growth in 40 sub-Saharan African countries using dynamic common correlated effect estimator which solves the problem of cross-section dependence which is a major problem of estimation of macro panel data (panels with a large number of observations across time and cross-section units). We also utilized four dimensions of trade as dependent variables for a better understanding of the relationship between trade and growth. The use of heterogeneous dimensions provides clear direction for policy measures and the robustness of the findings. Furthermore, the lack of consensus in the literature on the impact of trade on growth motivated us to carry the research in

3 See Dumitrescu and Hurlin (2012) for the discussion on the DH causality test.

this region using recent data and estimation techniques.

MATERIALS AND METHODS

Descriptions and Source of Data

The descriptions of the variables and source of data for the selected 40 sub-Saharan African countries over the period 1992-2018 are given in Table 1.

Table 1

Data description and sources

Variables	Descriptions	Sources
GDP growth	GDP growth rate	WDI
Trbl	Goods, value of trade balance (USD)	IMF
Reer	Real effective exchange rate index	WDI
Gcfm	Gross capital formation (USD)	WDI
Hcap	Human capital: Secondary school enrolment rate	WDI
Labf	Labor force participation rate	WDI
Totd	Total trade: Summation of export & import (USD)	WDI
Export	Exports of goods & services (USD)	WDI
Import	Imports of goods & services (USD)	WDI

Notes: WDI refers to World Development Indicators (2018)

Theoretical Framework and Empirical Model Specification

The starting point of the theoretical framework on economic growth is the neoclassical theory propounded by Solow (1956) and Swan (1956) which comprises a series of equations depicting the relationship between capital goods, labor-time, output, and investment. The divergence in capital formations explains the differences in economic growth across countries. Traditional neoclassical trade theories believed that trade as an engine of economic growth. The new growth theory (endogenous) emphasizes human capital development in forms of education, training, and technological advancement for the world market, and this account for its continued relevance. Empirical researches have attempted to study economic growth within the neoclassical framework. A production function is represented as output (Y) as a function of capital (K) and labor (L).

$$Y = A\,F\,(K, L) \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

This growth model was later extended by Mankiw et al. (1992) to include human capital. The growth model appears in the general form as:

$$Y_t = A_t K_t + H_t + L_t + e_t \ldots\ldots\ldots\ldots \quad (2)$$

where Y_t is the aggregate output, A_t is the productive factor, K_t is the physical capital stock, L_t is the labor force employed, H_t is the human capital stock, e_t is the error term while t is the time period.

$$GDP\ growth_{it} = \beta_0 + \beta' X_{it} + \lambda_i + \varepsilon_t + \mu_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

The GDP growth denotes the growth rate of country *i* at year *t*; β_0 is the constant parameter; X_{it} denotes the vector of explanatory variables; λ_i is the unobservable country effect; ε_t is the unobservable time effect; and μ_{it} is the disturbance term. The econometric models that investigate the impact of foreign trade on economic growth for sub-Saharan Africa using multiple trade dimension are presented below:

Model 1

$$GDP\ growth_{it} = \beta_0 + \beta_1 Imp_{it} + \beta_2 Reer_{it} + \beta_3 Gcfm_{it} + \beta_4 Hcap + \beta_5 Labf_{it} + \mu_{it} \quad (4)$$

Model 2

$$GDP\ growth_{it} = \beta_0 + \beta_1 Exp_{it} + \beta_2 Reer_{it} + \beta_3 Gcfm_{it} + \beta_4 Hcap + \beta_5 Labf_{it} + \mu_{it} \quad (5)$$

Model 3

$$GDP\ growth_{it} = \beta_0 + \beta_1 Trbl_{it} + \beta_2 Reer_{it} + \beta_3 Gcfm_{it} + \beta_4 Hcap + \beta_5 Labf_{it} + \mu_{it} \quad (6)$$

Model 4

$$GDP\ growth_{it} = \beta_0 + \beta_1 Totd_{it} + \beta_2 Reer_{it} + \beta_3 Gcfm_{it} + \beta_4 Hcap + \beta_5 Labf_{it} + \mu_{it} \quad (7)$$

In equation (4,5,6 and 7), cross-sections are donated by subscript *i* (where *i*=1,2,3,4,…,N) and time period by subscript *t* (where *t*=1,2,3,4,…,T), μ is the stochastic random disturbance, β_0 is the constant parameter and β_S are coefficients to be estimated. The specifications comprise GDP growth as a dependent variable and five independent variables. Real effective exchange rate (Reer), Gross capital fixed formation (Gcfm), Human capital (Hcap), Labour force (Labf), and one of the four trade dimensions (i.e. import, export, trade balance, and total trade) are used as explanatory variables. The variables selected for the model are based on the growth theory and extant literature.

Estimation Strategy

Cross-sectional Dependency Test. A significant body of literature in the panel analysis concluded that cross-section dependencies are likely to be overlooked in panel data which may occur as a result of common shocks and unobservable components such as oil price fluctuations and global financial crises that become part of the error term. The Pesaran and Chudik (2015) test for weak cross-sectional dependency was used in this study. Its statistic is given as;

$$\widetilde{PN} = \frac{2}{N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \breve{p}_{ij} \quad \ldots\ldots\ldots\ldots\ldots\ldots (8)$$

The null and alternative hypotheses of the test are;

$$H_0 : \mathcal{P}_{ij} = 0 \text{ for } i \neq j$$

$$H_1 : \mathcal{P}_{ij} \neq 0 \text{ for } i \neq j$$

Panel Unit Root. The unit root is the test for data stationarity. It checks the characteristic properties of the variables of interest to avoid the problem of spurious regression estimations associated with non-stationary of the series. In the context of panel data set, units or countries have different dynamics as a result of heterogeneity. The issue of heterogeneity has become a central point in panel data econometric analysis (Pesaran & Smith, 1995). Apart from this development towards the heterogeneous specification, the second generation panel unit root test is

developed to capture the influence of cross-section dependence in the panel. The first-generation panel unit roots are modeled on cross-sectional independent hypothesis and its regression model is univariate:

$$\Delta y_{it} = \rho_i y_{it-1} + z'_{it}\gamma + u_{it} \quad \text{.....(9)}$$

However, the second generation panel unit root by Pesaran (2007) is able to address the flaw of the first generation panel unit root test because it captures the cross-sectional dependency by augmenting the standard augmented Dickey Fuller (ADF) test with the cross-sectional average of lagged levels and first differences of the cross-section. Its major strength is the ability to capture cross-section dependence and produce a robust estimate for both micro and macro panels (T>N and N>T). The model is specified as follows;

$\Delta y_{it} = \alpha_i + \beta_i y_{t-1} + y_i F_t + \varepsilon_{it}$ .....(*10*)

$H_0 : \beta_i = 0$ for all i

$H_1 : \beta_i < 0$ for all i

F_t *and* ε_{it} are unobserved common effects and individual-specific (idiosyncratic) error.

Westerlund Error Correction Model Panel Cointegration Test. This study investigates the presence of a long-run association between integrated series that possess time *(T)* and cross-section *(N)* dimension. Cointegration analysis has received large concern in literature because most financial hypotheses and economic theories are long-run induced, their relationship hardly identified in the short-run. Furthermore, most researches that examine cointegration have failed to reject the null hypothesis of no long-run equilibrium against the theoretical postulation of cointegration. The main argument behind the above assertion is that panel data and time series analyses require that the variables must be in the same order of integration. This imperfection was rectified by Westerlund and Edgerton (2007), who took into consideration the cross-section dependence among the series and proposed four cointegration estimators to give more robust and reliable estimations. The first two tests statistics is called Group Mean Statistics (Ga and Gt) to check the alternative hypothesis of the whole panel is cointegrated, while the other two statistics is called Panel Statistics (Pa and Pt) are used to check the alternative hypothesis of least one unit of the panel is cointegrated. The advantage of this test over others is that there are no factor restrictions. Consider the error correction term (ECT) models in equations (11), (12) and (13) below:

$$\Delta A_{i,t} = \alpha_i^A + \lambda^A \left(A_{i,t-1} - \beta_i^A B_{i,t-1} - \gamma_i^A C_{i,t-1} \right) + \sum_{j=1}^{n} \emptyset A_{i,j} \Delta A_{i,t-j} + \sum_{j=1}^{p} \emptyset A_{i,j} \Delta C_{i,t-j} + \sum_{j=1}^{m} \delta A_{i,j} \Delta B_{i,t-j} + \mu_{i,t} \quad \text{.....(11)}$$

$$\Delta B_{i,t} = \alpha_i^B + \lambda^B \left(B_{i,t-1} - \beta_i^B A_{i,t-1} - \gamma_i^B C_{i,t-1} \right) + \sum_{j=1}^{n} \delta B_{i,j} \Delta B_{i,t-j} + \sum_{j=1}^{m} \theta B_{i,j} \Delta A_{i,t-j} + \sum_{j=1}^{p} \theta B_{i,j} \Delta C_{i,t-j} + \varepsilon_{i,t} \quad \text{.....(12)}$$

$$\Delta C_{i,t} = \alpha_i^C + \lambda^C \left(C_{i,t-1} - \beta_i^C B_{i,t-1} - \gamma_i^C A_{i,t-1} \right) + \sum_{j=1}^{p} \emptyset C_{i,j} \Delta C_{i,t-j} + \sum_{j=1}^{m} \delta C_{i,j} \Delta B_{i,t-j} + \sum_{j=1}^{n} \theta C_{i,j} \Delta A_{i,t-j} + e_{i,t} \quad \text{.....(13)}$$

The parameters λ_i^k, $K \in (A,B,C)$ are the coefficients of ECT and it shows the speed of adjustment towards equilibrium. This paper focuses on variable A in relation to B and C; thus, equation (11) is the equation of interest.

Pesaran and Chudik (2015) Dynamic Common Correlated Effects Estimator-(CS-ARDL). Dynamic Common Correlated Effect Estimator developed by Pesaran and Chudik (2015) was utilized in this study. This method of estimation allows for cross-sectional dependence and controls for endogenous regressors, robustness, correction of small sample biases, and supports both balanced and unbalanced panels (Ditzen, 2016). The model becomes most appropriate in this study because of the heterogeneous nature of the countries considered in this study, it also allows for the estimations of both short-run and long-run effects. The equation for the model is expressed as;

$$\gamma_{it} = \alpha_{it} + \varphi_i \gamma_{i,t-1} + \beta_0 x_{it} + \beta_1 x_{i,t-1} + \sum_{l=0}^{\rho T} \delta_i' \acute{Z}_{t-1} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots (14)$$

where;

$\bar{Z}_t = (\bar{y}_t, \bar{y}_{t-1}, \bar{x}_t)$, cross sectional means (i.e variables in $\bar{Z}_t$)

ρT = number of lags of cross-sectional averages, γ_{it} = dependent variable,

x_{it} = independent variables

RESULTS AND DISCUSSIONS

Cross-sectional Dependency Test Result

Using Pesaran (2015) test for weak cross-sectional dependence, the results in Table 2 show the presence of cross-sectional dependence in all the variables. This is evidenced by the fact that all the probability values of CD statistics are significant at the 1% in all the variables under investigation. This means that a shock in any of the countries selected in sub-Saharan Africa tends to be transmitted to other countries within the panel. Based on this reason, the

Table 2

Pesaran (2015) test for weak cross sectional dependence

Variables	CD Statistics	P-value	Decisions
GDP growth	68.268	0.000	Cross-sectional dependency
Gcfm	16.138	0.000	Cross-sectional dependency
Hcap	77.949	0.000	Cross-sectional dependency
Labf	137.742	0.000	Cross-sectional dependency
Reer	21.053	0.000	Cross-sectional dependency
Export	118.344	0.000	Cross-sectional dependency
Import	120.221	0.000	Cross-sectional dependency
Trbl	24.732	0.000	Cross-sectional dependency
Totd	121.214	0.000	Cross-sectional dependency

stationarity of the data was tested using the cross-sectional augmented Dickey Fuller (CADF) test that took into account cross-sectional dependence into consideration. We, therefore, based our analysis on CS-ARDL specifications.

Table 3 presents the result of Pesaran (2007) CADF panel unit root tests. The result suggests that GDP growth, gross capital formation, and real effective exchange rate are stationary at levels but secondary school enrolment rate, labor force participation rate, exports, imports, trade balance and total trade are stationary at the first difference as depicted in Table 3. The variables are not integrated in the same order, GDP growth, gross capital formation and real effective exchange rate are I(0) but secondary school enrolment rate, labor force participation rate, exports, imports, trade balance, and total trade are I(1). In order to test the long-run relationship between variables in a heterogeneous panel of sub-Saharan African countries, the second-generation panel cointegration test developed by Westerlund and Edgerton (2007) was adopted and the result is presented in Table 4.

The results of Westerlund and Edgerton (2007) ECM cointegration test are presented in Table 4 for all the trade variables (trade balance, exports, imports, and total trade). The probability values of all the equations revealed a presence of cointegration among the series; thus, it is required to estimate the long-term equilibrium relationships among the variables.

Table 3

Pesaran (2007) CADF unit root test

	Levels			First Difference			Order of Integration
Variables	T-bar	Z[T-bar]	P-value	T-bar	Z[T-bar]	P-value	
GDP growth	-3.553	-8.452	0.000	-5.298	-20.318	0.000	I(0)
Gcfm	-3.370	-7.211	0.000	-4.785	-16.833	0.000	I(0)
Hcap	-2.378	-0.463	0.322	-3.991	-11.432	0.000	I(1)
Labf	-2.357	-0.320	0.375	-2.580	-1.814	0.035	I(1)
Reer	-4.147	-7.902	0.000	-4.939	-11.309	0.000	I(0)
Export	-2.352	-0.284	0.388	-3.573	-8.586	0.000	I(1)
Import	-2.357	-0.320	0.375	-3.409	-7.476	0.000	I(1)
Trbl	-1.900	2.786	0.997	-3.517	-8.209	0.000	I(1)
Totd	-2.392	-0.557	0.289	-3.422	-7.565	0.000	I(1)

Note: 10% (cv10), 5% (cv5) and 1% (cv5) critical values are -2.540, -2.610 and -2.730 respectively

Table 4

Westerlund ECM panel cointegration tests

Statistics	Value	Z-value	P-value
Equation with trade balance			
Gt	-2.503	1.891	0.029
Ga	-6.309	4.460	1.000
Pt	-18.773	5.624	0.000
Pa	-13.649	4.468	0.000
Equation with exports			
Gt	-2.472	-1.700	0.045
Ga	-6.413	4.375	1.000
Pt	-20.836	-7.312	0.000
Pa	-14.421	-5.081	0.000
Equation with imports			
Gt	-2.544	-2.146	0.016
Ga	-5.980	4.731	1.000
Pt	-20.675	-7.181	0.000
Pa	-13.875	-4.647	0.000
Equation with total trade			
Gt	-2.513	-1.953	0.025
Ga	-6.097	4.635	1.000
Pt	-21.065	-7.500	0.000
Pa	-14.673	-5.282	0.000

The results of the Dumitrescu and Hurlin (2012) Granger non-causality test are presented in Table 5. The Z-bar statistics are statistically significant at 1% for all the hypotheses. The Z-bar tilde statistics are also significant. Hence, the null hypothesis can be rejected. Therefore, the results imply that total trade, imports, exports, and trade balance all granger cause economic growth in sub-Saharan African countries.

The results of Dynamic Common Correlated Effects are contained in Table 6.[4] In the short-run, the results evince a negative relationship between the exchange rate, secondary school enrolment, and labor force, and economic growth. On the other hand, gross capital formation, imports, exports, trade balance, and total trade are

4 We have also estimated the coefficients of the common dynamic process using the Augmented Mean Group. The coefficients for all the equations are significant, which implies that the dynamics of economic growth in the region are driven by some common factors such as geographical factors, global financial crisis, oil price shocks, and institutional quality.

Table 5

Dumitrescu and Hurlin (2012) Granger non-causality test results

Hypotheses	Z-bar	P-value	Z-bar tilde	P-value
Totd does not Granger-cause GDP growth	4.0598	0.0000	3.0880	0.0020
Export does not Granger-cause GDP growth	2.5805	0.0099	1.8328	0.0668
Import does not Granger-cause GDP growth	5.1497	0.0000	4.0127	0.0001
Trbl does not Granger-cause GDP growth	3.6566	0.0003	2.8741	0.0041

Table 6

Dynamic common correlated effects estimator (CS-ARDL

	Dependent variable: GDP growth			
Independent Variables	(1)	(2)	(3)	(4)
Short-run estimates				
Reer	-0.0408	-0.0441	-0.0427	-0.0430
	(0.0271)	(0.0295)	(0.0279)	(0.0289)
Gcfm	0.0456***	0.0493***	0.0211**	0.0457***
	(0.0105)	(0.0113)	(0.0103)	(0.0105)
Hcap	-0.0341	-0.0270	-0.0163	-0.0307
	(0.0349)	(0.0361)	(0.0307)	(0.0355)
Labf	-2.185*	-2.329*	-1.256**	-2.191*
	(1.266)	(1.207)	(0.559)	(1.228)
Import	0.0573**			
	(0.0250)			
Export		0.0876**		
		(0.0342)		
Trbl			5.21e-10	
			(1.10e-09)	
Totd				0.0410**
				(0.0178)
Long-run estimates				
Reer	-0.0570	-0.0522	-0.0427	-0.0481
	(0.0402)	(0.0360)	(0.0279)	(0.0328)
Gcfm	0.0472***	0.0534***	0.0211**	0.0464***
	(0.0112)	(0.0115)	(0.0103)	(0.0104)

Table 6 *(Continued)*

	Dependent variable: GDP growth			
Independent Variables	(1)	(2)	(3)	(4)
Long-run estimates				
Hcap	-0.0517	-0.0323	-0.0163	-0.0357
	(0.0482)	(0.0429)	(0.0307)	(0.0393)
Labf	-2.525*	-2.612*	-1.256**	-2.311*
	(1.422)	(1.341)	(0.559)	(1.296)
Import	-0.943***			
	(0.0250)			
Export		-0.912***		
		(0.0342)		
Trbl			-1.000***	
			(1.10e-09)	
Totd				-0.959***
				(0.0178)
Observations	1,080	1,080	1,080	1,080
R-squared	0.450	0.451	0.324	0.455
Number of Countries	40	40	40	40
Diagnostic statistics				
F-statistics	2.87	2.87	1.68	2.92
P-value of F-statistics	0.0000	0.0000	0.0000	0.0000
CD test statistics	5.22	3.61	7.84	4.57
P-value of CD statistics	0.0000	0.0003	0.0000	0.0000

Note: Standard errors in parentheses, ***, ** and * denotes 1%, 5% and 10% level of significance respectively

positively related to economic growth. The results concur with the findings of Kim and Lin (2009), Lawal et al. (2016), and Ulaşan (2015) who reported a short-run positive impact of trade on economic growth. However, the result indicates that the real exchange rate, school enrollment, and trade balance are statistically insignificant. This shows that when the dynamic component of the relationship between economic growth and its determinants are considered, these variables are insignificant in determining the rate of economic growth in the short run. Meanwhile, capital formation remains highly significant with greater impact (0.0493) when the export is included in the model than when other components and aggregate trade is considered in the model. Similarly, imports, exports, and total trade are statistically significant at 5% level. This affirms the theoretical proposition that trade is an engine of growth. For instance,

Grossman and Helpman (1991) trade model posits that trade leads to endogenous growth through the diffusion of technology and knowledge. The findings also relate to the conclusion of the neoclassical models which show that trade leads to welfare gains, increase income, and ensure economic growth.

In the long-run, while the sign and significance of the other variables remain the same, the coefficients of exports, imports, trade balance, and total trade becomes negative and highly significant at 1% level. This reveals that trade has a significant negative effect on economic growth in the long-run. The finding is also consistent with the results of Lawal et al. (2016) who reported a long-run negative impact of trade on growth. Similarly, Vlastou (2010) confirmed a negative impact of trade openness on the economic growth of 34 selected African countries. In the long-run, rise in imports might lead to the overdependence of the African countries on foreign goods and services and the destruction of domestic industries. This is because most of the domestic industries cannot compete with their counterparts across the globe and importation ruins the domestic industries. Similarly, sub-Saharan African countries mostly export primary products and it is a major source of foreign exchange for the countries. Therefore, an increase in exports will generally lead to higher income which encourages more imports. Eventually, import-competing industries will fail, and the current account deteriorates. The F-statistic shows that all the models have overall significance while the cross-sectional dependency test shows the presence of cross-sectional dependence. Therefore, the technique is appropriate, and the results are valid for policy inferences.

CONCLUSIONS

This study explores the relationship between foreign trade and economic growth using data of 40 sub-Saharan African countries over the period of 1992-2018. Due to the presence of cross-section dependence in the series, we applied Pesaran (2007) cross-sectional augmented Dickey Fuller (CADF) panel unit root test of stationarity to identify the integrating order of the variables. Westerlund and Edgerton (2007) ECM panel cointegration test was estimated to investigate the long-run equilibrium. To examine the direction of causality between variables, the Dumitrescu and Hurlin (2012) Granger non-causality test was utilized. The effect of foreign trade on economic growth was estimated using Dynamic Common Correlated Effects Estimator (CS-ARDL).

The empirical findings evince different order of integration I(0) and I(1) among the variables confirmed by CADF panel unit root test. The Dumitrescu and Hurlin (2012) Granger non-causality test results imply that total trade, imports, exports, and trade balance all Granger cause economic growth in sub-Saharan Africa. The imports, exports, trade balance, and total trade measures were used as trade variables. However, the findings from the dynamic common correlation effect estimations reveal varying results. In the short-run, the results evince a

negative relationship between the exchange rate, secondary school enrolment, and labor force, and economic growth. On the other hand, gross capital formation, imports, exports, trade balance, and total trade are all positively related to economic growth. In the long-run, while the sign and significance of the other variables remain the same, the coefficients of exports, imports, trade balance, and total trade becomes negative and highly significant at 1% level. This reveals that trade has a significant negative effect on economic growth in the long-run.

We conclude that foreign trade significantly increases the economic growth of sub-Saharan Africa countries in the short-run. In order to achieve a long-run relationship between foreign trade and economic growth in sub-Saharan Africa, the policies of export diversification and import substitution industrialization need to be vigorously implemented. This is because exports of sub-Saharan African countries are mainly primary commodities, which prices are very unstable and determined on the foreign market. For outward-oriented strategy in sub-Saharan Africa to have a larger effect on growth, the countries need to modify the structures of a trade by diverting from exports of raw materials to high value-added goods. Moreover, trade policy measures should be directed towards the promotion of investments in capital intensive sectors and human capital development that can absorb technological advancement from advanced countries.

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REFERENCES

Asfaw, H. A. (2014). Trade policy and economic growth in sub-Saharan Africa: A panel data approach. *American Journal of Trade and Policy, 1*(1), 94-101.

Balassa, B. (1978). Exports and economic growth: Further evidence. *Journal of Development Economics, 5*(2), 181-189.

Brueckner, M., & Lederman, D. (2015). Trade openness and economic growth: Panel data evidence from sub-Saharan Africa. *Economica, 82*(1), 1302-1323. https://doi.org/10.1111/ecca.12160

Chen, H. (2009). A literature review on the relationship between foreign trade and economic growth. *International Journal of Economics and Finance, 1*(1), 127-130.

Dinç, D., Gökmen, A., Nakip, M., & Azari, N. (2017). The impact of foreign trade issues on economic growth in some developing countries including Iran and Turkey. *Journal of Transnational Management, 22*(3), 171-202.

Ditzen, J. (2016). *Xtdcce: Estimating dynamic common correlated effects in Stata* (SEEC Discussion Papers, 1601). Edinburgh, England: Spatial Economics and Econometrics Centre, Heriot Watt University.

Dumitrescu, E., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic Modeling, 29*(4), 1450-1460.

Eris, M. N., & Ulasan, B. (2013). Trade openness and economic growth: Bayesian model averaging estimate of cross-country growth regressions. *Economic Modelling, 33*(1), 867-883.

Gries, T., Kraft, M., & Meierrieks, D. (2009). Linkages between financial deepening, trade openness, and economic development: Causality evidence from sub-Saharan Africa. *World Development, 37*(1), 1849- 1860. https://doi.org/10.1016/j.worlddev.2009.05.008

Grossman, G. M., & Helpman, E. (1991). *Innovation and growth in the global economy.* Cambridge, USA: MITPress.

Helpman, E., & Krugman, P. (1985). *Market structure and foreign trade.* Cambridge, USA: MIT Press.

Idris, J., Yusop, Z., & Habibullah, M. S. (2016). Trade openness and economic growth: A causality test in panel perspective. *International Journal of Business and Society, 17*(2), 281-290.

Islam, M. N. (1998). Export expansion and economic growth: Testing for cointegration and causality. *Applied Economics, 30*(1), 415-425.

Jouini, J. (2015). Linkage between international trade and economic growth in GCC countries: Empirical evidence from PMG estimation approach. *Journal of International Trade and Economic Development, 24*(3), 341-372.

Kilic, N. Ö., & Beser, M. (2017). Relationship of foreign trade and economic growth in Eurasian economy: Panel data analysis. *International Journal of Economics and Finance, 9*(9), 1-7.

Kim, D.-H. (2011). Trade growth and income. *Journal of International Trade and Economic Development, 20*(5), 677-709.

Kim, D.-H., & Lin, S.-C. (2009). Trade and growth at different stages of economic development. *Journal of Development Studies, 45*(8), 1211-1224. https://doi.org/10.1080/00220380902862937

Konya, L. (2006). Exports and growth: Granger causality analysis on OECD countries with a panel data approach. *Economic Modeling, 23*(6), 978- 992.

Lawal, A. I., Nwanji, T. I., Asaleye, A., & Ahmed, V. (2016). Economic growth, financial development and trade openness in Nigeria: An application of the ARDL bound testing approach. *Cogent Economics and Finance, 4*(1), 1-15.

Love, J., & Chandra, R. (2004). Testing export-led growth in India, Pakistan and Sri Lanka using a multivariate framework. *The Manchester School, 72*(4), 483-496.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics, 107*(2), 407-437.

Manwa, F., Wijeweera, A., & Kortt, M. A. (2019). Trade and growth in SACU countries: A panel data analysis. *Economic Analysis and Policies, 63*(1), 107-118.

Michaely, M. (1977). Exports and growth: An empirical investigation. *Journal of Development Economics, 4*(1), 49-53.

Mputu, C. L. (2016). *Terms of trade, trade openness and economic growth in sub-Saharan Africa* (Culminating Projects in Economics, 3). Retrieved July 25, 2018, from https://repository.stcloudstate.edu/econ_etds/3

Musila, J. W., & Yiheyis, Z. (2015). The impact of trade openness on growth: The case of Kenya. *Journal of Policy Model, 37*(1), 342-354. https://doi.org/10.1016/j.jpolmod.2014.12.001

Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics, 22*(1), 265-312.

Pesaran, M. H. (2015). Testing weak cross-sectional dependence in large panels. *Econometric Reviews, 34*(6-10), 1089-1117.

Pesaran, M. H., & Chudik, A. (2015). Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors. *Journal of Econometrics, 188*(1), 393-420.

Pesaran, M. H., & Smith, R. P. (1995). Estimating long-run relationships from dynamic heterogeneous panels. *Journal of Econometrics, 68*(1), 79-113.

Roquez-Diaz, A., & Escot, L. (2017). Relationship between trade openness and economic growth in Latin America: A causality analysis with heterogeneous panel data. *Review of Development Economics, 22*(1), 658-684.

Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics, 70*(1), 65-74.

Swan, T. W. (1956). Economic growth and capital accumulation. *Economic Record, 32*(2), 334-361.

Tahir, M., & Norulazidah, D. (2013). The relationship between trade and income: The case of developed countries. *International Research Journal of Finance and Economics, 1*(111) 138-145.

Tekin, R. B. (2012). Development aid, openness to trade and economic growth in least developed countries: Bootstrap panel granger causality analysis. *Procedia-Social and Behavioral Sciences, 62*(1), 716-721. https://doi.org/10.1016/j.sbspro.2012.09.121

Ulaşan, B. (2015). Trade openness and economic growth: Panel evidence. *Applied Economics Letter*, *22*(2), 163-167. https://doi.org/10.1080/13504851.2014.931914

United Nation Conference of Trade and Development. (2005). *Developing countries in international trade: Trade and development index.* New York, USA: United Nations Publication.

United Nation Conference of Trade and Development. (2014). *The role of international trade in the post-2015 development agenda.* Geneva, Switzerland: United Nations Publication.

United Nation Conference of Trade and Development. (2016). *Trade and current account balances in sub-Saharan Africa: Stylized fact and implications for poverty.* Trade and Poverty Paper (Series No. 1). Geneva, Switzerland: Author.

United Nations. (2017). *Overview of recent economic and social development in Africa.* Department of economic and social affairs. New York, USA: United Nations Publication.

Vlastou, I. (2010). Forcing Africa to open up to trade: Is it worth it? *The Journal of Developing Areas, 44*(1), 25-39. https://doi.org/10.1353/jda.0.0086

Wacziarg, R., & Welch, K. (2008). Trade liberalization and growth: New evidence. *The World Bank Economic Review, 22*(1), 187-231.

Were, M. (2015). Differential effects of trade on economic growth and investment: A cross-country empirical investigation. *Journal of African Trade, 2*(1), 71-85. doi:10.1016/j.joat.2015.08.002

Westerlund, J., & Edgerton, D. (2007). Simple tests for cointegration in dependent panels with structural breaks. *Oxford Bulletin of Economics and Statistics, 70*(5), 665-704.

World Development Indicators. (2018). *World development indicators.* Washinton, USA: The World Bank.

Wynne, M., & Kersting, E. (2007). *Openness and inflation* (Staff Papers No. 2). Dallas, USA: Federal Reserve Bank of Dallas.

Yanikkaya, H. (2003). Trade openness and economic growth: A cross-country empirical investigation. *Journal of Development Economics, 72*(1), 57-89.

Zahonogo, P. (2017). Trade and economic growth in developing countries: Evidence from sub-Saharan Africa. *Journal of African Trade, 3*(1), 41-56. http://dx.doi.org/10.1016/j.joat.2017.02.001

APPENDIX

Appendix 1

List of 40 sub-Saharan African countries selected

Angola	Congo, Dem. Rep.	Kenya	Nigeria
Benin	Congo, Rep.	Lesotho	Rwanda
Botswana	Equatorial Guinea	Liberia	Sao Tome and Principe
Burkina Faso	Eritrea	Madagascar	Senegal
Burundi	Ethiopia	Malawi	Seychelles
Cabo Verde	Gabon	Mali	Sierra Leone
Cameroon	Gambia, The	Mauritania	South Africa
Central African Republic	Ghana	Mauritius	Togo
Chad	Guinea	Namibia	Uganda
Comoros	Guinea-Bissau	Niger	Zambia