GLOBALIZATION AND ECONOMIC GROWTH IN AFRICA

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Abstract
Using the endogenous growth framework and panel regression techniques, this study investigates the impact of globalization on economic growth in Africa from 1980 to 2017. Two proxies of globalization were utilized in the study, namely trade openness (as a measure of trade globalization) and the Chinn-Ito index (as a measure of financial globalization). A long run relationship was found between growth and the associated variables. Under the period of investigation, trade globalization exerted more significant impact on economic growth in Africa in contrast to financial globalization, suggesting that trade globalization mattered more for economic growth than financial globalization. A well-articulated and coordinated set of economic policies is recommended to encourage investment in fixed capital, human capital and promote trade, with a view to improving economic growth arising from globalization in the continent.

Keywords: Africa, Globalization, Economic Growth, Endogenous Growth Theory, Panel Regression Techniques
JEL classifications: C33, F02, F43

1. Introduction
Globalization has been a main driver of growth worldwide for several decades. Its speed, in terms of trade, off-shoring, finance, and information and technology flows, has been unprecedented in modern economic history (Leipziger, 2020). Its impact on economic growth has continued to stimulate scholarly investigation. Since the mid-1980s, it has elicited considerably attention from academic and policy circles. Undoubtedly, the phenomenon, though with no regularity of definition and meaning, is an influential force determining the future of mankind (Intriligator, 2003). The huge expenditure of energy in investigating the nature and impact of the phenomenon is expected, given the increasing "global village" status of planet earth, and the unparalleled tempo of interdependence, increased foreign direct investment inflows and increased international trade, including the explosion in the use and deployment of the internet linking countries and regions.

A study of globalization as an important growth stimulant in Africa is important, given that despite the distributional questions that remain, it still offers the best outcome for the most people due to its efficiency (Mishkin, 2006). For instance, it has been found to be responsible for the significant reduction in poverty in several countries including China and Vietnam, leveraged the poorer European countries to increase average incomes, as well as raises hope in Africa, where a large segment of the population is still bedeviled by poverty. For Africa, trade openness, a dimension of globalization, is critical, given that it is one of the policies adopted by developing countries in the late 1980s, and in view of the finding that outward oriented countries perform better than inward oriented countries. It is thus a globalization policy pursued by both developed and developing countries (Kpoghul, Okpe & Anjande, 2020). In addition, contemporary patterns indicate increasing financial globalization relative to regionalization, while higher levels of financial integration are associated with higher levels of growth (Adeyele & Ouedraogo, 2019).Thus the benefits of trade and financial globalization to growth in Africa remain important.

Despite the documented benefits of globalization, skepticism remains. Evidence has been provided indicating that globalization (proxied by such variables as foreign direct investment and capital openness) has no effect on growth (Alesina, Grilli & Milesi-Ferretti, 1994; Rodrik, 1997). Thus the impact of globalization on economic growth remains an empirical question.

From the foregoing, this paper investigates the impact of globalization on economic growth in Africa. Following the introduction, the paper has the following structure. The literature is reviewed in section 2. The methodology used is presented in section 3. The empirical results are provided and discussed in section 4, while section 5 concludes.

2. Literature Review

2.1. Conceptual Clarification and Theoretical Literature

Globalization does not have a universally accepted definition. Each definition in the literature merely reflects the dimensions of the phenomenon. While Beck (2000) regards it as the increase in the significance of transnational corporations, Clark (2000) considers it as the creation of networks of connections which link people, capital, goods, information and ideas. Rodrick (1999) views it as a rapid increase in technological and liberalized trade and investment, resulting in huge gains in communications and efficiency while shifting wealth and production frontiers. Thus globalization induces changes in a country's economic, political and social architecture (Mittleman, 2000).

According to Caselli (2006), three dimensions of globalization exist in contemporary theory. These are *economic*, *political* and *cultural*, with sub-dimensions. It needs to be noted that the lack of a universally acceptable definition of globalization is emboldened by the absence of a clear-cut theory. In addition, the distinguishing factor of globalization is that it enfolds the entire world, a condition that distinguishes it from other forms of countries' international openness. In this study, globalization is conceptualized as the extent to which a continent or region is integrated in terms of trade and finance with the rest of the world.

This is consistent with the definition by the International Monetary Fund which considers it as "the integration of economies throughout the world through trade, financial flows, the exchange of technology and information, and the movement of people" (cited in Ouattara, 1997).

Generally, the literature on the globalization-economic growth nexus can be broadly categorized into three. According to scholars in the first category, globalization accentuates economic growth. The argument of these "globalisation optimists" is that it fosters growth through the promotion of competition, improvement in resource allocation, resulting in increased efficiencies. This consequently attracts foreign capital and expertise, allowing the elimination of economic distortions resulting from government interventions (Chandan & Christiansen, 2019).On the other hand, it has been argued that globalization harms growth, and this is especially so where institutions are weak and political instability is rife (De Melo, Gourdon & Maystre, 2008). Coupled with this is the argument that the "promised link between globalisation and development" has been elusive in Africa due to external attrition (Amah, 2018: 19).The third category covers studies that found nonlinear relationship between globalization and growth, while emphasizing the effect of complementary policies (Borensztein, De Gregorio & Lee, 1998; Caldero´n & Poggio, 2010; Chang, Kaltani & Loayza, 2009)

2.2Empirical Literature

The impact of globalization on growth is not conclusive in the literature. Results are generally mixed. In this study, it is grouped under those which reported positive and negative impact or relationship, results of causality tests, and those which investigated the impact of globalization on growth while controlling for complementary policies.

Dreher (2006) constructed an index of globalization and used it to analyse whether the overall index and sub-indexes affect economic growth in 123 countries from 1970 to 2000. The results showed that globalization promoted growth. Bataka (2019) investigated the *de jure* and *de facto* globalization indices and their effect on economic growth in Sub-Saharan Africa. Using Panel Second-Generation tests, it was found that *de jure* globalization increased economic growth, while *de facto* globalization undermined it. Similarly, Hasan (2019), utilizing the Pooled Mean Group (PMG) panel cointegration technique, investigated the impact of globalization (overall, economic, social, and political) on economic growth of South Asian countries from 1971 to 2014 and found that all the globalization indicators accelerate economic growth in the long-run, while in the short run, the effect is not significant. A study on 11 African countries by Pare (2016), using the KOF index of globalization and Pooled Regression, Fixed and Random Effects models found evidence that globalization has a negative impact on economic growth in Africa.

Some studies have examined the globalization-growth nexus using causality tests. In light of this, Maqbool-ur-Rahman (2015) studied the impact of globalization (proxied by the Dreher index on GDP of three South Asian countries (Pakistan, India, and Bangladesh) from 1981 to 2011. Using OLS and Granger causality methods, a bidirectional causality was found

for India, while unidirectional causality was reported for Pakistan and Bangladesh. In addition, Egbetunde and Akinlo (2015) investigated the causality and long-run nexus between financial globalization from 1980 to 2013 on Sub-Saharan Africa, using panel cointegration techniques, and found evidence of bi-directional causality between financial globalization and growth. In the same vein, Kilic (2015) investigated the effects of globalization (economic, social and political) on the economic growth of 74 developing countries from 1981 to 2011, using Fixed Effects, Least Squares and Dumitrescu-Hurlin (Dumitrescu & Hurlin, 2012) causality test. The results revealed that economic growth levels of selected developing countries were positively affected by the economic and political globalization whereas social globalization affected economic growth negatively. Also, causality showed forward two-way causality relationship between political and social globalization and the economic growth and one way causality relationship from social globalization to economic growth. A related study was conducted by Chu, Chang and Sagafi-nejad (2016) which examined the nature and direction of causation between globalization and economic growth in nine OECD countries and China from 1981 to 2008. Deploying a Bootstrap Panel Granger Causality Test, the results supported evidence of causality from globalization to economic growth for Netherlands and the UK; causality from economic growth to globalization in the US, and neutrality for Australia, Belgium, Canada, France, Italy, and Japan.

On the impact of globalization on growth, while controlling for complementary policies, Samimi and Jenatabadi (2014) investigated the economic growth effect of globalization, as well those of complementary policies in OIC countries from 1980 to 2008, using the Dreher (2006) Globalization (KOF) Index. Evidence from the OLS, Fixed Effects and Random Effects, Generalized Method of Moments techniques deployed showed that positive effect is increased in the countries with better-educated workers and well-developed financial systems, and hence the effect of economic globalization is dependent on a country's income level, as high and middle-income countries benefit from globalization whereas low-income countries do not.

A review of the literature on globalization-growth nexus indicates that although several techniques have been deployed, only a handful used second generation panel estimation techniques on Africa. The nature of panel data in terms of heterogeneity and cross section dependence has hardly been explored, conditions that are likely to impact empirical results. This paper thus contributes to the empirical literature on the globalization-growth nexus by deploying the PMG panel estimation technique, and the Fixed Effect Model (for robustness), using data on African countries.

2.3Theoretical Framework

Globalization is conceived to positively impact global output and thus on economic growth. Thus, whether considered from the Heckscher-Ohlin theory on the basis of comparative advantage and the associated factor endowments, or the new trade theories which link increased output to increasing returns to scale, globalization is viewed as critical.

It is seen as advancing and promoting international trade, making possible rapid disposal and acquisition of goods and services globally. Thus, there has been greater integration of markets, thereby reducing barriers and engendering positive impact on economic fundamentals (Stiglitz, 2003; Dollar, 2004). Moreover, globalization is imperative to economic growth and vice-versa, and consequently mutually reinforcing, implying that globalization induces higher flows of foreign direct investment, while growth stimulates further need for integration (UNCTAD, 2011; Aninat, 2002).

In addition, insights from the endogenous growth theory (see Grossman & Helpman, 1991; Aghion & Howitt, 1992), suggest that the long-run growth rate of an economy is based on endogenous factors. It emphasizes technical progress resulting from the rate of investment, the size of the capital stock, and the stock of human capital. Thus a framework which regresses growth on physical capital stock, human capital stock and proxies of trade and financial globalization is helpful in explaining how globalization impacts growth. In this sense, economic growth derives from a country's integration into the global market place.

3. Methodology

3.1 Data Sources

This study uses annual data spanning 1980 to 2017 for 30 African countries. The period of study is chosen with respect to data availability. The sample of countries used is provided in appendix 1.

Data on growth, labour and trade openness are from the World Bank (2019). Data on Gross fixed capital formation are from the database of the United Nations Conference on Trade and Development (UNCTAD, 2019), while data on Chinn-Ito index are from http://www.ssc.wisc.edu/~mchinn/research.html or http://web.pdx.edu/~ito/.For missing data, 3-year moving average values were generated. Thus, the estimates were implemented using a balanced panel data set.

3.2 Measurement of Variables

Several ways of measuring globalization exist in the empirical literature, partly due to non-availability of standard rule for its measurement. This is by no means strange, considering that globalization is a complex and phenomenon with multifaceted processes. It is therefore difficult to have an index that completely reflects all its dimensions, despite the attempts at providing various indexes (Caselli & Gemelli, 2008; Arribas et al., 2009).

However there are single and synthetic indices of globalization. The single indices use two groups of proxies, i.e. De facto and De jure measurement, and capture the level of restrictions placed on the movement of goods, services and capital and are measured using *Openness* and *Average tariff rates* (for trade globalization), while *IMF restrictions measurement, Chin Ito Index, FDI* and *Foreign assets and liabilities* are used in the case of financial globalization. The synthetic indices of globalization include *KFP, KOF* (see

Dreher, 2002), *CSGR* (see Caselli & Gemelli, 2008), *MGI* (see Martens, Dreher & Gaston, 2008), *NGI* (see Vujakovic, 2009) and *G-Index* (see Randolph, 2001).

In this paper, we have used two measures of globalization, i.e. trade openness (as a measure of trade globalization) and the Chinn-Ito index (as a measure of financial globalization).*Trade Openness* is the ratio of trade (addition of export and import) to the GDP. Its appeal is due to the ease of calculation and availability of data across countries (Agénor, 2004; Bradford, 2009). The *Chinn-Ito index* (Chinn and Ito, 2006) measures the degree of capital openness called KAOPEN, which is normalized between 0 and 1. The higher the value, the more open a country is said to be. *Growth* was measured as annual percentage changes in Gross domestic product, in line with the empirical tradition. *Capital* was proxied by gross fixed capital formation, while *Labour* was measured as total population from ages 15 to 64.

3.3 Model Specification and Estimation Procedure

Following the endogenous growth model (Grossman & Helpman, 1991; Aghion & Howitt, 1992), augmented to include globalization variables, this study investigates the impact of globalization on Africa's economic growth.

Three panel models are specified to examine the globalization-growth nexus. The study starts with a model that explores the growth impact resulting from trade openness (equation 1), followed by one that explores the impact of capital openness on growth (equation 2), after which the two globalization indicators are included in a third specification (equation 3) as follows:

$$GR_{it} = \beta_0 + \beta_1 Cap_{it} + \beta_2 Lab_{it} + \beta_3 Tradeopen_{it} + u_{it} \quad (1)$$

$$GR_{it} = \beta_0 + \beta_1 Cap_{it} + \beta_2 Lab_{it} + \beta_3 Kaopen_{it} + u_{it} \quad (2)$$

$$GR_{it} = \beta_0 + \beta_1 Cap_{it} + \beta_2 Lab_{it} + \beta_3 Tradeopen_{it} + \beta_4 Kaopen_{it} + u_{it} \quad (3)$$

where GR_{it} denotes growth (annual growth rate of real GDP in country *i* and year *t)*; Cap_{it}, is fixed capital (proxied by gross fixed capital formation in country *i* and year *t*); Lab_{it} is labour (measured as labour supply in country *i* and year *t)*; $Tradeopen_{it}$ represents trade openness (ratio of trade, i.e. sum of export and import to the GDP in country *i* and year *t*); $Kaopen_{it}$ denotes degree of capital openness in country *i* and year *t*); and u_{it} is the error term.

Examining the nature of cross sections and whether or not the series are homogenous and cross-sections dependentis important, as the results should inform the type of unit root and cointegration tests, including estimation techniques used. The existence or otherwise of panel cross-sectional dependence was first tested, using the Breusch and Pagan (1980); ii) the Pesaran, Ullah and Yamagata (2008) bias-adjusted LM; and iii) the Pesaran (2004) cross sectional dependence (CD) tests respectively.

The stationarity properties of the variables were thereafter explored using Pesaran (2007) which allows for heterogeneity in the autoregressive coefficient of the Dickey-Fuller regression, taking into consideration the existence of a single unobserved common factor which has heterogeneous factor loadings in the data. The test of cointegration was thereafter implemented, using the Westerlund (2007) framework. A rejection of the null of no cointegration necessitated the estimation of the specified models using the Pooled Mean Group (hereafter PMG) and Mean Group (hereafter MG) estimators. Thus, the PMG (Pesaran, Shin and Smith, 1999) and the MG estimator (Pesaran & Smith, 1995) were used to estimate the short-run and the long-run impact of globalization on economic growth.

The presumption in the PMG estimation is that long run coefficients are equal across groups whereas the intercepts, short run coefficients and error variances are different (Pesaran, Shin & Smith, 1999). In the case of the MG estimator, regressions are implemented for each group separately and then the means of coefficients over groups are computed (Pesaran & Smith, 1995). Thus, the MG estimator emphasizes estimating time-series regressions and averaging the coefficients, whereas the PMG estimator is based on combining pooled and averaging of coefficients.

Comparing the PMG and MG estimates in terms of their asymptotic properties is essentially a question of trade-off between consistency and efficiency. Generally, if in fact the long-run coefficients are equal across units (or countries in the context of this paper), the PMG estimates are efficient and consistent, compared to the MG estimates which are only consistent. Should the long-run coefficients be different across countries, the PMG estimates are not consistent, in comparison to the MG estimates which are consistent. In comparing the PMG and MG estimates of the long run coefficients, the Hausman or likelihood ratio tests can be used to test the long-run homogeneity restrictions. In like manner, comparing the small sample properties of these estimators is dependent on the presence of outliers to which both estimators are sensitive. In particular, the MG estimator is very sensitive to country estimates that are outlying, due essentially to the fact that it is an unweighted average, in comparison to the PMG estimator whose performance is much better in that its estimates are similar to the country-specific estimates (i.e. their weighted averages), in which weights are derived from the inverse of their related variance-covariance matrix, and thus according to their precision.

The PMG and MG technique can be explained by means of an Autoregressive Distributed Lag (*p, q*) model in an error-correction form:

$$\Delta(y_i)_t = \sum_{j=1}^{p-1} \varpi_j^i \Delta(y_i)_{t-j} + \sum_{j=0}^{q-1} \phi_j^i \Delta(X_i)_{t-j} + \lambda' \left[(y_i)_{t-1} - \{\varphi_0^i + \varphi_1^i (X_i)_{t-1}\}\right] + \varepsilon_{it} \qquad (4)$$

where *y* is economic growth, *X* denotes globalization indicators, ϖ and ϕ represent short-run coefficients, φ signifies the long-run coefficients, λ is the error correction term, ε is a time-varying error term, *i* and *t* symbolize country and time respectively.

The PMG and MG techniques are useful for a number of reasons. First, they are suitable in situations where the regressors being examined are I(0) or I(1) or of mixed integration. In

light of this, some authors consider pre-testing unnecessary (e.g., Duasa, 2006; Akinlo, 2006). What is required is the existence of a long-run relationship among the series while the dynamic model is suitably augmented in a manner that ensures that the explanatory variables are not only strictly exogenous but that serial correlation does not exist (Pesaran, Shin and Smith, 1999). Second, the techniques are helpful in an attempt to ensure efficiency and consistency. The estimations were implemented in STATA13 and the optimal lag-length used in the PMG was based on the Schwarz Bayesian Criterion.

4. Results and Discussion

The descriptive statistics of the variables used in the study are presented in appendix 2. The average economic growth rate for Africa from 1980 to 2017 is 2.3%, the maximum being 57.8% recorded for Seychelles, while the growth declined by as much as 28.6% for Sierra Leone within the same. The correlation matrix generally indicates absence of multicollinearity. The results of the test of panel cross-sectional dependence are shown in Table 2B of the appendix. The null of independence is rejected as indicated by the statistically significant values.

The panel unit root test results are presented in Table1.

Table 1: Pesaran Panel unit root test results

Variable	Number of lags		
	1	2	3
Gr	-1.392	-1.583	-1.252
Cap	-2.376*	-2.204**	-2.234**
Lab	-2.255**	-1.944	-1.740
Tradeopen	-2.639*	-2.203**	-2.392*
Kaopen	-2.412*	-2.585*	-2.469*

Note: The critical values are -2.080 (10%), -2.160 (5%) and -2.300 (1%) respectively. * and **denote significant at 1% and 5% respectively.
Source: Authors' computations

Results in Table 1 suggest that the panel series except growth (*Gr*) are stationary, as there is a rejection of the null hypothesis of non stationarity for all independent variables in at least 1 lag. Thus, it is concluded that Cap, Lab, Trade open and Kaopen have a unit root and are I (1), while Gr is nonstationary. Results of the panel unit roots suggest that the series are amenable to the PMG and MG frameworks. As the existence of a long-run relationship is required for the PMG and MG techniques (Pesaran, Shin & Smith, 1999), the cointegration test results are presented in Table2.

Table 2: Westerlund panel cointegration test results

Panel A: Results for model 1

	1 lag		2 lags	
	Statistic	Z-value	Statistic	Z-value
Gt	-3.32*	-6.316	-3.215*	-5.702
Ga	-7.538	2.669	-6.154	3.747
Pt	-18.200*	-7.267	-18.200*	-7.267
Pa	-10.517*	-2.553	-10.517*	-2.553

Panel B: Results for model 2

	1 lag		2 lags	
	Statistic	Z-value	Statistic	Z-value
Gt	-3.247*	-5.893	-3.127*	-5.195
Ga	-6.849	3.206	-6.399	3.557
Pt	-16.784*	-5.928	-16.784*	-5.928
Pa	-8.101	-0.535	-8.101	-0.535

Panel C: Results for Model 3

	1 lag		2 lags	
	Statistic	Z-value	Statistic	Z-value
Gt	-3.288*	-4.835	-3.109*	-3.805
Ga	-6.392	4.692	-4.563	6.000
Pt	-17.006*	-4.836	-17.006*	-4.836
Pa	-8.249	0.763	-8.249	0.763

Note: * denotes significant at 1%.

Source: Authors' computations

There is evidence of a long-run equilibrium relationship among the variables in the three models as indicated in Panels A, B and C of Table2. The null hypothesis of no cointegration is rejected by at least two of the statistics in each case. Thus, globalization and economic growth have a long-run equilibrium relationship. The PMG and MG coefficients are presented in Table3. The individual country estimates are not shown, to conserve space.

Table 3: PMG and MG regression coefficients

Panel A: Results for model 1

	PMG			MG		
Variable	Coefficient	Std. Error	Z-Statistic	Coefficient	Std. Error	Z-Statistic
			Long Run Equation			
Cap	.2104225***	.1189382	1.77	.9580557*	.7128287	1.34
Lab	1.995167*	.2940976	6.78	1.131468	1.924213	0.59
Tradeopen	1.90085*	.336421	5.65	.9989199	1.287766	0.78
			Short Run Equation			
ECM	-.5790689*	.0580304	-9.98	-.7387497*	.0623536	-11.85
Δ Cap	1.329746**	.6035123	2.20	1.009806	.6392244	1.58
Δ Lab	4.393358	14.01206	0.31	-10.6054	.37606	-0.42
Δ Tradeopen	1.50427***	.7701623	1.95	1.203601	.7552798	1.59
Intercept term	-22.02358*	2.281039	-9.66	-7.220598	13.59988	-0.53
	Hausman χ^2: 1.83; Prob. (χ^2): 0.6076					

Panel B: Results for model 2

	PMG			MG		
Variable	Coefficient	Std. Error	Z-Statistic	Coefficient	Std. Error	Z-Statistic
			Long Run Equation			
Cap	.1650166	.124961	1.32	.559393	.8171487	0.68
Lab	2.165148*	.2981128	7.26	2.675631	1.926048	1.39
Kaopen	.1335659	.3876095	0.34	-.3577258	1.386328	-0.26
			Short Run Equation			
ECM	-.5643489*	.0569476	-9.91	-.7294569	.0589261	-12.38
Δ Cap	1.817445**	.7209071	2.52	1.376368***	.729823	1.89
Δ Lab	5.313533	16.69291	0.32	-7.801035	37.32179	-0.21
Δ Kaopen	2.322001***	1.404003	1.65	2.51578***	1.553151	1.62
Intercept term	-18.31473*	1.846449	-9.92	-21.57712	13.978	-1.54
	Hausman χ^2: 1.80; Prob. (χ^2): 0.6146					

Panel C: Results for model 3

	PMG			MG		
Variable	Coefficient	Std. Error	Z-Statistic	Coefficient	Std. Error	Z-Statistic
			Long Run Equation			
Cap	.1470897	.115771	1.27	.7430937	.6862739	1.08
Lab	2.168616*	.2836496	7.65	.9733136	1.678122	0.58
Tradeopen	1.838795*	.3379293	5.44	1.124463	1.445774	0.78
Kaopen	.2121795	.3740087	0.57	.1320644	1.861333	0.07
			Short Run Equation			

ECM	-.5839927*	.0593765	-9.84	-.7745074*	.0619242	-12.51
Δ Cap	1.39564**	.6188	2.26	.9621525	.665036	1.45
Δ Lab	4.339625	14.1014	0.31	-23.58229	32.04814	-0.74
Δ Tradeopen	1.280126***	.7449052	1.72	1.105831	.7155252	1.55
Δ Kaopen	1.806377	1.30496	1.38	1.757603	1.472707	1.19
Intercept term	-23.31716*	2.427292	-9.61	-4.976414	13.02818	-0.38
Hausman χ^2: 1.34; Prob. (χ^2): 0.8546						

Note: * , ** and *** represent 1%, 5% and 10% level of significance respectively.
Source: Authors' computations

As reported in Panels A, B and C of Table3, the Hausman test statistics and their associated probability values indicate that the PMG estimator is more consistent and efficient than the MG estimator. Analysis of the globalization-growth nexus in this study is therefore on the PMG results.

4.1 Estimated Short-Run Coefficients

As shown in Table3, the traditional growth determinants (labour and capital) are positively related to growth in the short run, consistent with the theoretical expectation. However, labour is not statistically significant at the conventional levels in all three models estimated.

The two globalization indicators (i.e. trade openness and capital openness) have a direct (positive) relationship with growth in the short run. The trade openness coefficients are statistically significant. Whereas the capital openness coefficient is statistically significant in model 2, the reverse is the case in model 3. The results suggest that trade openness tends to significantly impact growth where capital openness is excluded in the regression (model 1), and in like manner capital openness is a statistically significant determinant of growth where trade openness is excluded in the regression (model 2). When both trade openness and capital openness are used in the same regression (model 3), the former turns out to be statistically significant while the latter is not. Importantly, results in Panel B in table 3 show a strong complementary effect between capital openness and gross fixed capital formation (proxy for capital) to enhance economic growth. Thus, capital openness may bring about advanced technology, which increases the growth rate of Africa when it possesses adequate levels of gross fixed capital formation. In essence, the growth benefits of rising financial openness depends on the level of progress made in the quantum of existing fixed capital formation.

The coefficients of the speed of adjustment (ECM) are all correctly signed and significant at 1% level, a validation of the test of cointegration among the variables employed in the study. The speed of adjustment is moderate (about 58%).

4.2 Estimated Long-Run Coefficients

As expected, labour and capital are positively related to growth in the long run. Capital is statistically significant where there is trade openness (model 1), but its significance is lost when capital openness is included (model 2), and when trade and capital openness variables are included (model 3). Labour is statistically significant in all the models estimated. What is glaring from the estimated long-run coefficients is that higher growth rates are associated with trade globalization, and the converse is the case with capital openness. To further explore the validity of this inference, robustness checks were implemented by estimating fixed and random effect models respectively and the results are presented in Table 4.

Table 4: Robustness checks

Variable	Fixed Effect Model	Random Effect Model	Hausman
Cap	.9188662*	.9079333*	χ^2: 97.33
Lab	1.520589*	-.3579394	Prob(χ^2): 0.0000
Tradeopen	2.973294*	3.206641*	
Kaopen	.4528226	.6319013	
Intercept	-39.63483*	-12.00779*	
No. of obs	1140	1140	
No. of groups:	30	30	
F-statistic	63.16	-	
Prob. (F-statistic)	0.0000	-	
Wald χ^2	-	Wald χ^2 : 190.05	
Prob. (χ^2)	-	Prob (χ^2): 0.0000	

Note: * and ** represent 1% and 10% level of significance respectively.
Source: Authors' computations.

As reported in Table 4, the Hausman test indicates that the fixed effect model is to be preferred. Consequently, both capital and labour inputs are significant determinants of growth in Africa. Importantly, while trade and financial globalization are positively related to growth, it is only the former that is statistically significant.

It should be noted that the coefficients in both techniques selected (i.e. PMG and fixed effects) show that the impact of trade globalization on growth is positive and significant, as against financial globalization which is not a statistically significant determinant of growth in Africa under the period of investigation. It is consistent with the earlier findings by Zhuang and Koo (2007) which reported that economic globalization has a significant positive effect on economic growth for all 56 countries studied (comprising 19 developed and 37 developing countries). The current findings are particularly demonstrative of the positive and significant impact of trade globalization on growth, echoing the earlier empirical findings by Rao and Vadlamannati (2010) in a study on 21 low income African countries. This suggests that trade globalization as a policy option by African countries,

including other developing countries as echoed by Kpoghul, Okpe and Anjande (2020) might not have been misplaced. The findings differ from those reported by Baliamoune (2002) indicating that trade openness trade does not seem to enhance growth in poor countries.

The results of the conventional labour variable used in the study are by no means surprising, given Africa's human capital standing. It needs to be noted that labour was captured by the total population from ages 15 to 64, who are mainly part of the labour force but may not be in employment. Similarly, the results linking financial globalization to growth are not surprising, given the nature of capital flight in Africa. It has been reported that as much as 60 cents for each new dollar of external borrowing by African countries exit the continent as capital flight in the same year (Ndikumana et al., 2015), constituting significant constraint to economic growth. Thus, large-scale capital flight is endemic in Africa (AfDB and GFI, 2013), and has reduced Sub-Saharan Africa to a 'net creditor' to the rest of the world (Ndikumana & Boyce, 2008).

5. Conclusions

This paper investigates the impact of globalization on economic growth in Africa, covering the period of 1980 to 2017. Based on the endogenous growth framework augmented to capture two globalization variables (trade openness and the Chinn-Ito index), the findings show that there is cointegration between economic growth and the associated regressors used in the study. The estimated coefficients indicate that trade openness and capital openness are positively related to economic growth in both the long and short run periods. In all the models estimated, labour is not a statistically significant variable impacting growth in the short run. The globalization indicators (trade openness and capital openness) are positively related to growth. The trade openness indicator is statistically significant in all the models estimated, as against the capital openness indicator, suggesting that trade openness tends to significantly impact growth where capital openness is excluded in the regression, and in like manner capital openness is a statistically significant determinant of growth where trade openness is excluded in the regression. When both are employed, trade openness is statistically significant while capital openness is not.

In the long run, labour and capital are positively associated with growth, although capital is not statistically significant, except where there is trade openness, while labour is statistically significant in all the models estimated. Moreover, significant higher growth rates are associated with trade globalization, as against capital openness which is not significant. Results from the robustness checks indicate that capital and labour are significant determinants of growth in Africa, with trade globalization positively related to growth and statistically significant, while financial globalization is positively related but not statistically significant.

A useful conclusion from the empirical findings is that trade globalization appears to matter more for growth in Africa compared to financial globalization. This suggests that trade globalization tends to have mattered for economic growth in Africa under the period

of investigation, in comparison to financial globalization. Importantly, labour (proxied by total population from ages 15 to 64) does not appear to improve growth in Africa.

Based on the empirical findings, there is the need to bolster the level of capital and labour in Africa. This is expedient, given the continent's vast natural resources which can be harnessed to raise economic growth and to deal with the multifaceted problems it faces. Boosting capital and improving labour quality of labor would require cautious policies that encourage investment and attract capital from within and outside the continent. To this end, Africa requires a well articulated and coordinated set of economic policies that attune its needs to the reality of the globalised world. In addition, the continent requires massive gross fixed capital formation and labour (human capital) to harness its huge natural endowments through cautious policies that encourage investment and attract foreign capital. Even where financial openness exerted a positive impact on growth, it depends on the existing fixed capital formation, as indicated by the estimated results in the short run. To realize any gain from financial globalization therefore, Africa needs complementary policies between capital openness and gross fixed capital formation, if it is to enhance economic growth in the short run.

References

Adams, S. (2008). Globalization and income inequality: implications for intellectual property rights. *Journal of Policy Modeling,* 30, 725-735.

Adeyele, I.T., & Ouedraogo, I. (2019). Effect of Regional Financial Integration and Governance Quality on Economic Growth in ECOWAS(2001-2016).*Journal of Economics and Allied Research*, 3(2), 1-17.

African Development Bank [AfDB] and Global Financial Integrity [GFI] (2013). Illicit Financial Flows and the Problem of Net Resource Transfers from Africa: 1980-2009.Tunis/Washington DC.

Agénor, P. R. (2004). Does globalization hurt the poor? *International Economics and Economic Policy,* 1, 21–51.

Aghion, P., & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica*, 60, 323-351.

Akinlo, A.E. (2006). The stability of money demand in Nigeria: An autoregressive distributed lag approach. *Journal of Policy Modeling,* 28, 445-452.

Alesina, A., Grilli, V., & Milesi-Ferretti, G. M. (1994). The political economy of capital controls. InLeiderman, L., & Razin, A. (eds.), *Capital Mobility: The Impact on Consumption, Investment and Growth.* Cambridge University Press, Cambridge, pp. 289–321.

Amah, O.E. (2018). *Globalisation and Leadership in Africa*. Springer.

Aninat, E. (2002). Surmounting the challenges of globalization. *Finance and Development* 39, no.1, 4–7.

Arribas, I., Pérez, F., & Tortosa-Ausina, E. (2009). Measuring globalization of international trade: Theory and evidence. *World Development*, 37(1), 127–145.

Baliamoune, M. N. (2002). Assessing the impact of one aspect of globalization on economic growth in Africa. University of North Florida, America. Discussion Paper No. 2002/91

Bataka, H. (2019). De jure, De facto Globalization and Economic Growth in Sub-Saharan Africa. *Journal of Economic Integration* 34(1), 133–158.

Beck, U. (2000). *What is globalisation?* Cambridge, Polity.

Borensztein, E., De Gregorio, J., & Lee, J.W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, 45, 115-135.

Bradford, C. (2009). Effects of Globalization on Income Inequality in High Income Countries. *Bryant Economic Research Paper* 2.

Breusch, T., &Pagan, A. (1980). The Lagrange multiplier test and its application to model specification in econometrics. *Review of Economic Studies*, 47, 239–253.

Caldero´n, C., & Poggio, V. (2010). Trade and Economic Growth Evidence on the Role of Complementarities for CAFTA-DR Countries. World Bank Policy Research, Working Paper No.5426.

Caselli, M. (2006). On the nature of globalization and its measurement. Some notes on the A.T. Kearney/Foreign Policy Magazine Globalization Index and the CSGR Globalization Index. UNU-CRIS Occasional Papers. Universita Cattolica del Sacro Cuore, Milano.

Caselli, M., & Gemelli, L. (2008). Measuring… What? Notes on Some Globalization Indices. In *Regionalisation and the Taming of Globalisation*, West Midlands, United Kingdom, pp. 383–404.

Chang, R., Kaltani, L., & Loayza, N.V. (2009). Openness can be good for growth: The role of policy complementarities. *Journal of Development Economics*, 90, 33-49.

Chinn, M. D., & Ito, H. (2006). What Matters for Financial Development? Capital Controls, Institutions, and Interactions. *Journal of Development Economics*, 81(1), 163-192.

Chu, H., Chang, T., & Sagafi-nejad, T. (2016). Globalization and Economic Growth in Revisited: A Bootstrap Panel Causality Test. *Cyrus Chronicle Journal*, 23–37.

Clark, W.C. (2000). Environmental globalization. In Josept, S.N. and John, D.D. (eds.), *Governance in a Globalizing World* (pp. 86-108). Washington, DC: Brookings Institution Press.

De Melo, J., Gourdon, J., & Maystre, N. (2008). Openness, Inequality and Poverty: Endowments Matter. World Bank Policy Research Working Paper No.3981.

Dollar, D. (2004). Globalization, poverty and inequality since 1980. World Bank Policy Reserve Paper 3333, Washington, D.C.

Dreher, A. (2006). Does globalization affect growth? Evidence from a new index of globalization. *Journal of Applied Economics,* 38(10).

Duasa, J. (2007). Determinants of Malaysian trade balance: An ARDL bound testing approach. *Global Economic Review,* 36(1), 89-102.

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

Egbetunde, T., & Akinlo, A. E. (2015). Financial Globalization and economic growth in Sub-Saharan Africa: Evidence from panel co integration tests. *African Development Review,* 27(3), 187–198.

Figini, F., and Santarelli, E. (2006). Openness, economic reforms, and poverty. *The Journal of Developing Areas,* 39, 129-151.

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

Hasan, M.A. (2019). Does globalization accelerate economic growth? South Asian experience using panel data. *Journal of Economic Structures,* 8(26). https://doi.org/10.1186/s40008-019-0159-x

Intriligator, M. (2003). Globalization of the world Economy. Potential Benefits and Costs and a net Assessment. Milken Institute Policy Brief, No.33. California

Kilic, C. (2015). Effects of globalization on economic growth: Panel data analysis for developing countries. *Economic Insights – Trends and Challenges,* IV (LXVII) No. 1, 1–11.

Kpoghul, E.T., Okpe, I.J., & Anjande, G. (2020). A Macro-Econometric Analysis of Trade Openness, Foreign Direct Investment and the Performance of the Nigerian Economy. *Journal of Economics and Allied Research*, 4(3), 1-24.

Leipziger, D. (2020). Globalization Revisited. In: Spence, M. & Leipziger, D. (eds), *Globalization and Growth, Implications for a Post-Crisis World*. Commission on Growth and Development, pp. 1-347.

Maqbool-ur-Rahman, M. (2015. Impacts of globalization on economic growth-evidence from selected South Asian countries. *Journal of Management Sciences*, 2(1), 185-204. https://doi.org/10.20547 /jms.2014.15021 03

Martens, P., Dreher, A., & Gaston, N. (2008). The Global village and the social and cultural aspects of globalization. GDC Working Papers, 17.

Mishkin, F. (2006). *The Next Great Globalization: How Disadvantaged Nations Can Harness Their Financial Systems to Get Rich*. Princeton, NJ: Princeton University Press.

Mittleman, J.H. (2000). *The globalization syndrome: transformation and resistance*. Princeton, N.J., Princeton University Press.

Ndikumana, L., & Boyce, J. K. (2008). New estimates of capital flight from Sub-Saharan African countries: Linkages with external borrowing and policy options. Political Economy Research Institute, University of Massachussets Amherst.

Ndikumana, L., Boyce, J. K., & Ndiaye, A.S. (2015). Capital flight from Africa: Measurement and drivers. In I. Ajayi and L. Ndikumana (eds.), *Capital Flight from Africa: Causes, Effects and Policy Issues*. Oxford: Oxford University Press, pp. 15–54.

Ouattara, A.O. (1997). The Challenges of Globalization for Africa. Lecture paper delivered at the International Monetary Fund on 21 May 1997. Available at: https://www.imf.org/en/News/Articles/2015/09/28/04/53/sp052197 (accessed 18/9/2019).

Pare, T. U. (2016). The Impact of Globalization in Africa. A Thesis Submitted to the Graduate Faculty of St Cloud State University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Applied Economics, Published.

Pesaran, H., & R. Smith (1995). Estimating Long-Run Relationships from Dynamic Heterogeneous Panels. *Journal of Econometrics* 68, 79-113.

Pesaran, H., Shin, Y., & Smith, R. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association* 94, 621-634.

Pesaran, M. H. (2004). General Diagnostic Tests for Cross Section Dependence in Panels. University of Cambridge, Working Paper, 0435.

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

Pesaran, M.H., *Ullah*, A., & *Yamagata*, T. (*2008). A bias-adjusted LM test of error cross section* independence. *Econometrics Journal*, 11(1), 105–127.

Randolph, J. (2001). G-Index globalisation measured. World Markets Research Centre.

Rao, B. B., & Vadlamannati, K. C. (2010). Globalization and Growth in the low-income African Countries with the Extreme Bounds Analysis. *Economic Modelling*, 795–805.

Rodrick, D. (1999). The New Global Economy and Developing Countries: Making Openness Work (Policy essay NO.24). Washington DC: Overseas Development Council.

Rodrik, A. (1997). *Has globalization gone too far?* Washington: Institute for International Economics.

Samimi, P., & Jenatabadi, H. S (2014). Globalization and economic growth: Empirical evidence on the role of complementarities. *Plos One*, 9(4), 1–7.

Stiglitz, J. (2003). *Globalization and Its discontents.* New York: Norton.

United Nations Conference on Trade and Development (UNCTAD) (2011). World Investment Report. Geneva: UNCTAD

United Nations Conference on Trade and Development (UNCTAD) (2019). unctad.org/en/Pages/statistics.aspx

Vujakovic, P. (2009). How to measure globalisation? A New Globalisation Index (NGI), WIFO Working Papers.

Westerlund, J. (2007). Testing for Error Correction in Panel Data. *Oxford Bulletin of Economics and Statistics*, 69(6), 709-748.

World Bank (2019). World development indicators. Washington DC: World Bank.

Zhuang, R., &Koo, M. M. (2007). Economic growth under globalization: Evidence from panel data analysis. Selected Paper Prepared for Presentation at the American Agricultural Economics Association Annual Meeting, Portland.

Appendix 1: Countries covered

Benin, Botswana, Central African Republic, Cote d'Ivoire, Cameroon, Algeria, Egypt, Gabon, Ghana, The Gambia, Kenya, Morocco, Madagascar, Mali, Mauritania, Mauritius, Malawi, Niger, Nigeria, Rwanda, Sudan, Senegal, Sierra Leone, Seychelles, Chad, Togo, Tunisia, Uganda, South Africa and Zimbabwe.

Appendix 2: Descriptive statistics and correlation matrix

Table 2A: Descriptive statistics

	GR	CAP	LAB	TRADEOPEN	KAOPEN
Mean	2.299782	7.242148	15.33853	4.065821	0.292488
Maximum	57.83775	11.35919	18.43716	5.416203	1.000000
Minimum	-28.62430	3.450941	10.45881	1.843774	0.000000
Std. Dev.	4.196606	1.713737	1.451636	0.464153	0.272140
Observations	1140	1140	1140	1140	1140
			Correlation Matrix		
GR	1.00	0.01	-0.19	0.31	0.18
CAP	0.01	1.00	0.70	-0.06	-0.06
LAB	-0.19	0.70	1.00	-0.48	-0.34
TRADEOPEN	0.31	-0.06	-0.48	1.00	0.19
KAOPEN	0.18	-0.06	-0.34	0.19	1.00

Source: Authors' computations

Table 2B: Serial dependence test results

Test type	Statistic		
	Model 1	Model 2	Model 3
Breusch-Pagan LM	682.9*	738.5*	605.2*
Pesaran scaled LM	23.97*	29.78*	14.26*
Pesaran, Ullah and Yamagata Bias-corrected scaled LM	1.983**	7.652*	2.885*

Note: * and ** denote significant at 1% and 5% respectively.
Source: Authors' computations