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How Does International Trade Cum Regional Integration Affect Economic Growth? Insights from African Countries

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Abstract

The need to re-engineer growth in Africa has become increasingly glaring in the face of the prevailing economic shocks that exposed its inadequate productivity power for basic and vital food and drugs. According to the World Bank and several other international agencies, the potential for international trade, especially regional integration, remains huge. Theoretical literature supports this assertion, but the contradictory results from empirical studies necessitate employing robust techniques to reassess this relationship, especially as Africa engages in a continental trade agreement. This motivates the paper to assess the separate and joint effects of regional integration and international trade on economic growth. The study employed the System General Method of Moments (S-GMM) dynamic panel model for 40 selected countries across Africa. The findings show that regional integration and international trade, jointly and separately, impact positively and significantly on economic growth. The results provide empirical justification for a continuous push for regional integration and international trade for the attainment of economic growth in Africa.

Keywords: *International Trade, Regional Integration, Economic Growth, Africa*

Jel: *F130; F150; 0470*

1. Introduction

The recent global twin crises of the COVID-19 pandemic and the Russia-Ukraine war have motivated the need for more efficient and effective economic management. As is the aftermath of every crisis, most economies in the world are revisiting their economic management tools, some of which include: strategies to boost productivity, increase exports, and ultimately improve self-sufficiency, economic growth, and development. One key positive determinant of economic growth is international trade. Corroboratively, the neo-classical international trade theories show that increasing trade gains improve productivity. According to the World Trade Organisation (WTO), international trade has evidently been a key driver in reducing poverty and improving economic growth in both developed and developing countries (WTO, 2023). Noteworthy is the fact that, to improve international trade, some economies adopt regional integration to eliminate trade barriers and crystallise trade in the region. The effect is, however, subject to the level of self-sufficiency or exposure to external shocks and the potential of factor inputs that define production in member countries.

For example, the COVID-19 pandemic and the ways it was managed led to serious disruptions in global value chains and travel that affected international trade in Africa (Organisation for Economic Co-operation and Development, 2020; Yuni & Mantsi, 2023). Similarly, the Russia-Ukraine war disrupted the supply of primary farm inputs such as fertiliser and grain, consequently affecting commodity price increases (World Economic Forum, 2022; UNDP, 2022). Self-sufficient intra-regional trade may reduce such vulnerability to trade and could improve growth in regional value chains. Nevertheless, intra-regional trade in Africa was the lowest compared to other continents in 2022, recording 14%; a 2% drop from 2018 (World Trade Statistics Review, 2023).

Furthermore, the choice of trading partners, especially based on their development levels, could dictate trade gain magnitudes along value chains. Ovamba (2019) empirically shows that when Kenya trades with Sub-Saharan African (SSA) and Arab countries, it records a positive economic impact but records less impact when trading with high-income countries. African regional integration promotes free trade among countries that have relatively similar socio-economic structures. The African Union Commission (AUC) recognises eight Regional Economic Communities (RECs) in Africa (AUC 2019). The

RECs are mostly formed based on geographical locations, colonial associations, negotiations, and agreements, as well as shared history between the countries and/or within the regional organisations, which explains why some countries may belong to more than one REC. Ultimately, the AUC seeks to institute a continental integration agreement known as the African Continental Free Trade Agreement (AfCFTA).

Regional integration has the potential to boost international trade, ultimately reducing poverty and improving equitable economic growth. It improves local competition, productive efficiency, and consequently, price convergence across countries and regions, as well as the transfer of technological innovation (United Nations Development Programme [UNDP], 2011; Kayizzi-Mugerwa *et al*., 2014). The AfCFTA agreement, according to the World Bank Group, has the ability to end severe poverty for an estimated 30 million people, boost Africa's income by $450 billion, increase Africa's exports by $560 billion, and improve income levels for an additional 68 million people by 2035 (World Bank, 2020). However, this potential is conditional upon long-standing challenges of economic integration in Africa, such as macroeconomic disequilibria, poor human capital development, poor infrastructure, overvalued currencies, foreign debt service burdens, constrained income, and the overlapping membership of Regional Economic Communities in Africa (Food and Agriculture Organisation, 2003; Alexander & Garba, 2021).

In light of the potential for regional integration to improve national trade and economic growth in Africa vis-à-vis its challenges, there is a need to have empirical evidence on the extent to which the interaction between international trade and regional integration affects economic growth in Africa. The empirical literature on this topic abounds, particularly for country-specific studies. However, particular to these country-specific studies, there are comparatively fewer panel studies that look at the relationship between economic growth and international trade, and even fewer that take regional integration into account. The empirical evidence shows varying results depending on the specific country/region, the time scope covered, and the methodology employed. For example, Naveh *et al.* (2012) show that the regional integration between Iran and its northern neighbouring countries affects its long-term growth and welfare. On the contrary, Singoro (2021) has opined that financial integration in the East

African Community (EAC) has had no significant effect on economic growth in the region.

Meanwhile, only Kamau (2010) investigated how economic integration and international trade jointly and separately impact the economic growth of 26 African countries from specific regions. This study uses more updated data for the period 2007-2020 for a broader set of 40 countries. The study aims to ascertain the effect of international trade, regional integration, and their interactive effects on economic growth in African countries. More importantly, the study has employed the African Regional Integration Index (ARII), which is jointly produced by the AUC, the African Development Bank, and the United Nations Economic Commission for Africa, to proxy for regional integration. In addition, the study has adopted the S-GMM as it is acclaimed for its ability to correct time-invariant country-specific effects, omitted variable bias, measurement error, and endogeneity problems (Blundell & Bond, 1998; Blundell *et al.*, 2000, Yuni et al., 2023).

2. Literature Review

The mercantilist theory of the 1600s postulated that a favourable trade balance was significant in explaining an economy's wealth/prosperity, and self-sufficiency (Magnusson, 2011). It, however, assumed that wealth was static, and this assumption was used to explain why the European nations ventured to amass as much as possible via exports (Kenton, 2020). In an attempt to theorise propensity to trade, Adam Smith (1976) in his *Wealth of Nations* posits that division of labour and capital accumulation remain key in explaining productivity or economic growth. In supporting free international trade, Smith also argues that free trade promotes cheaper goods, more productivity, and more income if the countries produce goods in which they have an absolute cost advantage, all things being equal. Other growth and trade theories have established the relationship between international trade and economic growth.

In 1817, David Ricardo posited that a country benefits from trade by producing and exporting goods for which it has the greatest comparative cost advantage (Ricardo, 1817). Trade is a means for nations to increase revenue and reallocate wealth. Heckshare Ohlin's theory is an adaptation of the comparative advantage theory that justifies specialisation and commerce by considering the relative efficiency of the elements of production. The argument is based on

the idea that endowments vary among nations; some operate with a high capital intensity while others employ a high labour intensity. Heckshare Ohlin and other scholars, who make up orthodox or classical international trade proponents today, built on the theories of Smith and Ricardo. The classical-based theories explain the international trade theory predominantly from a country-specific perspective and differ from the modern trade theories, which are firm-based. The classical theories, in their attempt to explain international trade, inherently establish a strong positive relationship between international trade and economic growth.

From a country-specific perspective, Abdulkadir *et al.* (2017), Ahmad (2018), Bakit (2019), and Musinguzi and Rapha (2019) employed the Vector Error Correction Mechanism (VECM), Autoregressive Distributed Lag (ARDL), multiple regression models, and other tools to empirically show that international trade had a positive impact on economic growth in Bangladesh, Pakistan, Malaysia, and India, respectively. From an African perspective, authors such as Abubakar and Shehu (2015) for Kenya, Sulaiman and Ramli (2019) for Uganda, Javed *et al.* (2012) for Somalia, Elias *et al.* (2018) for Nigeria, Obadan and Okojie (2016) for Nigeria, and Sunday et al. (2023) for Nigeria found that international trade had a positive impact on economic growth. On the one hand, Nwamuo (2019) established a bi-directional relationship between trade openness and economic growth in Nigeria. Similarly, Mogoe (2022) and Mogoe and Mongale (2014), who used the VECM, established that the export and exchange rates are positively related to the Gross Domestic Product (GDP) while the import is negatively related to the GDP in South Africa.

From a panel perspective, Erkisi (2019) showed that international trade contributes to sustainable growth in the long run in Middle Eastern countries. Also, Abendin et al. (2021) investigated the interactive effect between international trade, the digital economy, and economic growth in 53 African countries using the S-GMM. They show that trade has a significant impact on economic prosperity both with and without the interactive term, and trade has a positive effect on economic growth when it interacts with the digital economy.

Conversely, Malefane and Odhiambo (2019) employed the ARDL bound test to show that trade openness has an insignificant impact on economic growth in Lesotho, both in the short and long run. Similarly, Husin (2018) showed that exports had no relationship with the economic growth of Malaysia; rather, imports had a significant

relationship with economic growth. In addition, Ali (2023) empirically posits that the export indicator is negatively related to the GDP, though statistically insignificant. In addition, Silajdzic and Mehic (2017) employed a fixed effects panel model to show that international trade has no significant impact on the economic growth of Central and Eastern European countries. Also, Ovamba (2019) has empirically shown that when Kenya trades with the SSA and Arab countries, it records a positive economic impact and less when trading with high-income countries. Furthermore, Radimersky and Hajko (2018) used panel data analysis for European Union countries, using the data set 1999–2011, to demonstrate that trade openness has an insignificant impact on growth. But when the trade partner growth is considered in the model, it is revealed that the trade partner growth had a significant impact on the GDP.

In terms of the relationship between regional integration and economic growth, Kamau (2010), Muriuki and Kosimbei (2015), Naveh et *al.* (2012), and Vamvakidis (1998) have empirically established a positive relationship. Kamau (2010) employed the S-GMM and constructed an economic integration index to show that economic integration and trade, separately and jointly, have a positive and significant impact on growth in the Common Market for Eastern and Southern Africa, the EAC, and the Southern African Development Community. Naveh *et al.* (2012) showed that the regional integration between Iran and its northern neighbouring countries affects its long-term growth and welfare. Similarly, Tinta *et al.* (2018) employed intra-community trade as a proxy of regional integration and showed, with the aid of panel fixed effects, that intra-community trade positively and significantly affects economic growth in ECOWAS, but trade openness does not significantly affect economic growth in ECOWAS. They, however, did not employ an interactive effect variable for trade and regional integration.

In the same vein, Muriuki and Kosimbei (2015) used terms of trade to proxy regional integration for a panel of countries in the EAC between 1977 and 2014 and showed that it had a significant and positive relationship with the GDP. Interestingly, Vamvakidis (1998) posited that the economies of countries near huge and open economies grow quicker than when the neighbours are conservative. This assertion could be seen in the formation of North-South trade alliances such as the African Growth and Opportunity Act. Contrary to these studies, Singoro (2021) opined that financial integration in the EAC has had no significant effect on economic growth in the region.

3.Methodology and Data

3.1 Methodology

The study adopts the neoclassical growth model of Solow (1956). The Solow model posits that growth is based on an aggregate production function that converges along a balanced growth path and is a function of technology, investment rate, and population growth rate. The study adopts the Cobb Douglass form of this theory and incorporates international trade proxied by exports and net exports as employed in Yuni et al. (2023) to specify the function below:

$$Y_t = AK_t^{\emptyset} L_t^{\pi} E_t^{\rho} \quad \ldots\ldots (1)$$

Where Y_t is the outcome variable, $K_t^{\emptyset}$ is capital proxied with capital formation, L_t^{π} is the Labour force (LF), E_t^{ρ} represents exports, and A is the parameter of technology, t represents the period $(t = 1..,T_i)$, $\emptyset, \pi$ and ρ are parameters to be estimated.

Given that the study employs a panel of 40 African countries with annual data from 2009 to 2020, the study employed a panel data analytic method, and the model above is transformed to:

$$Y_{it} = A_{it} K_{it}^{\emptyset} L_{it}^{\pi} E_{it}^{\rho} \ldots\ldots (2)$$

With log-linearisation, introducing the proxy for regional integration and the addition of other control variables adapted from the empirical works of Goff and Singh (2014) and Umeh *et al.* (2022), and the panel Cobb–Douglas production function stated in equation (2) becomes:

$$Y_{it} = \alpha_i Y_{it-1} + \emptyset_{it} K_{it} + \pi_{it} L_{it} + \rho_i E_{it} + \beta_i R_{it} + \delta_{it} X_{it} + \theta_i + u_t + \varepsilon_{it} \ldots (3)$$

Where i represents the country $(i = 1..,N)$, Y_{it} is real GDP; Y_{it-1} is the one-period lag of real GDP (LRG) in the country i, E_{it} represents two proxies for trade (exports and net exports as a percentage of GDP) in the country i , R_{it} represents regional integration while X_{it} represents a vector of control variables. $\alpha, \emptyset, \pi, \rho, \beta,$ and δ are the parameters and vectors of parameters to be estimated, θ_i represents country-specific effects, u_t represents period-specific effects, and ε_{it} is the error term. The control variables are based on theoretical and empirical inferences about the determinants of economic

development, as shown in Appendix 1. They include the real interest rate (RIR), private sector credit (PSC) as a percentage of GDP, inflation (CPI), government debt (GD) as a percentage of GDP, government effectiveness (GE), and FDI (% GDP).

To ascertain the broad objective of the paper, the study estimates three equations - variants of equation 3. In the first and second models, the study estimates equation (3), using exports in the first model and net-exports in the second model as proxies for international trade and omitting the interactive term. In the third model, both international trade and regional integration variables are omitted while including the interactive term for international trade and regional integration. The study employed the S-GMM initiated by Bond (1991) and developed by Blundell and Bond (1998) to estimate the model. The advantage of the S-GMM estimator over other panel estimators has been satisfactorily authenticated in the literature (Blundell & Bond, 1998; Blundell *et al.*, 2000; Soto, 2009). Due to the fact that it may address concerns about omitted variables and resolve endogeneity issues, the GMM is also admired for making parameter estimations more accurate (Maji *et al.*, 2019). Soto (2009) uses Monte Carlo simulations to demonstrate that the S-GMM estimator outperforms all other estimators, including the traditional first-differences GMM estimator, in smaller sample sizes (less than 100), which is typical in cross-country studies like this one.

The S-GMM estimator combines a system with a first-differences regression with a level regression such that variables in differences are instrumented with the lags of their levels, and the variables in levels are instrumented with the lags of their differences (Bond *et al.*, 2009; Uddin *et al.*, 2017). According to Uddin *et al.* (2017), the variances in the S-GMM are uncorrelated, even though the level of pre-set variables correlates with the country-specific fixed effect. Once more, according to Roodman (2009), the S-GMM is preferable to the difference GMM because the latter has a tendency to accentuate the gaps in unbalanced panel data. As a result, the S-GMM is better suited to analyse this unbalanced data set.

3.2 Data

The study used a panel consisting of 40 African nations with data between 2007 and 2020. In an effort to weed out cyclical swings and concentrate on the long-term, the study averages the data over 2-year non-overlapping periods, following Osei and Kin (2020). The number

of cross-sectional observations and time series used provides sufficient degrees of freedom for the methodology to produce robust results. Most of the data were obtained from the World Bank depository, while the index for regional integration was obtained from the ARII platform. The ARII was introduced into the data set as dummies across the time series observations, considering the 2019 report. Data for government effectiveness was obtained from the LOWY Institute Asia Power Index.

The 40 countries selected, based on data availability, include Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

The statistical summary of the variables in Table 1 shows that the average log real GDP is 23.24, ranging between a minimum of 20.46 and a maximum of 26.94. The average exports as a percentage of GDP is around 29.06%, with a huge standard deviation that shows gross variability across the selected countries. The regional trade index has a mean of 0.33 index and ranges between 0.20 and 0.63.

Table 1: Summary Statistics of the Variables

Description	Obs.	Mean	Std. Dev.	Min	Max
LGDP	280	23.24	1.39	20.46	26.94
Exports (% GDP)	280	29.06	15.38	0.53	88.92
Capital formation (% GDP)	273	24.45	9.66	6.12	76.71
Inflation (CPI)	276	7.93	25.43	-4.29	406.25
Government Debt	259	45.22	29.00	6.90	236.63
FDI (% GDP)	280	4.10	5.22	-9.51	35.69
Real Interest Rate	210	7.57	11.04	-79.16	50.33
Government Effectiveness	280	0.05	6.18	-1.78	51.66
Labour Force	280	66.09	11.53	42.46	87.61
Regional Trade Index	280	0.33	0.07	0.20	0.63

Source: Author's computation

The pairwise correlation matrix below shows that all coefficients are less than 0.6. This implies that we do not have enough information to suggest that there will be multi-collinearity between the variables.

Table 2: Pairwise Correlation of Variables

Var.	LRG	PSC	CF	CPI	GD	FDI	RIR	GE	EXP	NEXP	LF
LRG	1										
PSC	0.23	1									
CF	0.04	0.01	1								
CPI	0.10	-0.08	-0.08	1							
GD	-0.09	0.05	0.23	0.26	1						
FDI	-0.11	-0.05	0.49	-0.04	0.16	1					
RIR	-0.05	-0.11	0.11	-0.52	-0.11	0.22	1				
GE	0.13	0.04	-0.05	0.02	-0.05	0.08	-0.06	1			
EXP	0.03	0.18	0.35	-0.04	-0.03	0.29	-0.07	0.03	1		
NEXP	-0.30	0.01	-0.01	-0.00	0.13	0.00	-0.02	-0.07	0.07	1	
LF	0.03	-0.26	-0.06	0.09	-0.08	0.04	0.12	0.05	-0.22	-0.04	1

Source: Author's computation

4. Empirical Evidence

The results of the dynamic S-GMM specified above is presented in Table 3 for three models (presented in the 3 columns). All have the log of real GDP as the dependent variable. In the first two models, exports and net exports are introduced interchangeably with regional integration as a separate variable. In the third model, only the interactive dummy between regional integration and exports is introduced besides the control variables.

Table 3: Effect of International Trade and Regional Integration on Economic Growth.

Description	Dependent Variable - LRGDP		
	Model 1	Model 2	Model 3
Lag of Real GDP (-1)	0.99***	0.99****	1.001***
	(0.0001)	(0.0001)	(0.0001)
Exports (% GDP)	0.001**		
	(0.0228)		
Net Exports as (% GDP)		0.001**	
		(0.0111)	
Regional Integration	0.278***	0.272***	
	(0.0001)	(0.0001)	
Interactive dummy (export & regional integration)			0.0025***
			(0.0075)
Labour Force	0.001***	0.001***	0.001***
	(0.0001)	(0.0001)	(0.0006)
Capital formation (% GDP)	-0.00022	0.00065	−0.001
	(0.7390)	(0.1926)	(0.2810)
Private Sector Credit (% GDP)	−0.001***	−0.0008***	−0.001***
	(0.0001)	(0.0001)	(0.0001)
Inflation	−0.001***	−0.00054***	−0.001***
	(0.0001)	(0.0001)	(0.0001)
Government Debt	−0.0001***	−0.0009***	−0.001***
	(0.0001)	(0.0001)	(0.0001)
FDI (% GDP)	0.0027***	0.0029***	0.003***
	(0.0001)	(0.0001)	(0.0001)
Real Interest Rate	−0.001***	−0.0009***	−0.001***
	(0.0001)	(0.0013)	(0.0001)
Government Effectiveness	0.0118**	0.01042	0.0134**
	(0.0480)	(0.1319)	(0.038)
constant	0.221	0.3102	0.08
	(0.0966)	(0.0061)	(0.56)
Test for AR(1) errors - z	-1.724*	-1.725*	-1.73
	(0.0846)	(0.0845)	(0.08)
Test for AR(2) errors – z	0.42	0.398	0.448
	(0.67)	(0.69)	(0.65)
Hansen over-identification test	17.16	17.67	20.29
	(0.58)	(0.54)	(0.38)
Pesaran CD test for CSD	0.55	0.59	0.004
	(0.58)	(0.55)	(0.997)
Number of Observations	150	150	150

Source: Author's computation

Notes: *** p<0.01, ** p<0.05, * p<0.1.

The diagnostic tests of this model indicate all three models confirming that the serial correlation in the error terms is not second-order, given that the p-values of the AR (2) tests are all greater than 0.05, hence not significant at a 5% significant level. The number of instruments for the first model is 30 and 31 for the other two, which is less than the number of groups or countries: 40. The study equally employs the Hansen over-identification test to validate the instruments employed, given the insignificant p-values (all >0.05) at a 5% significant level. Finally, the Pesaran CD test with insignificant p-values also confirms that there is no cross-sectional independence that could bias the estimators. We, therefore, perceive the estimators as robust and reliable enough for policy inferences.

The results show that exports, net exports, regional integration, and its interaction with exports all contribute significantly and positively to economic growth in the panel of selected African countries. In the first model, exports as a percentage of GDP and regional integration have a probability value of 0.028 and 0.0001, showing that they are significant at 5% and 1% levels of significance, respectively. Similar results occur in the second model, wherein net exports (% GDP) are introduced. In the third model, the probability value for the interactive dummy between international trade and regional integration is 0.0075, suggesting that it is significant at the 1% level.

This result validates the existing theories relating to international trade and economic growth. The results also corroborate the works of Erkisi (2019), Mogoe (2022), and Mogoe and Mongale (2014), which suggest that international trade has a positive relationship with economic growth. The findings also uphold the arguments by Kamau (2010), Naveh *et al.* (2012), Muriuki and Kosimbei (2015), and Vamvakidis (1998) that show that regional integration positively affects economic growth. This empirically justifies the promotion of regional integration for the purpose of trade and promises economic progress if other contextual trade challenges are met.

However, the magnitude of the coefficients is very small. Though significant, none of the coefficients are up to 1. This is an indication that, though the relationship is positive and significant, its contribution to economic growth is minute. Hence, there is a need to optimise the effect of international trade and regional integration on economic growth; especially by overcoming the challenges that plague international trade and regional integration in the region. The magnitude of the coefficient for regional integration is, however,

higher than that for international trade, suggesting the higher potential that comes with regional integration and the need to begin implementation of the AfCFTA in Africa.

The lag of real GDP significantly and positively affects economic growth at a 1% significant level for all three models. The indicator for Labour force and FDI are significant and positively related to economic growth for all three models, while government effectiveness is positively and significantly related to economic growth only for the first and third models. These results are expected a priori, given that the labour force constitutes human capital, which, according to the Cobb Douglass production function, is relevant for growth. An increase in FDI translates to an increase in money in circulation through the multiplier effect, and the government's effectiveness reflects the effective and efficient allocation of resources and strong institutions.

Additionally, inflation, government debt, and real interest significantly and negatively affect economic growth in all three models, as expected. The higher the inflation, the lower the overall demand, which leads to a contraction of the economy. Increasing government debt translates to increasing debt servicing and decreasing expenditure in other vibrant sectors of the economy, while lower interest rates generally boost investments and ultimately economic growth. Surprisingly, private sector credit as a percentage of GDP is significant but negative. The private sector credit is expected to boost local firms, thereby increasing productivity. This could be explained by the characterisation of African economics, which is predominantly driven by government financing, so the share of the private sector to GDP dwindles with growth.

5. Conclusion

International trade remains a pertinent instrument for productivity, and its efficient constitution has seen the rise of several economic powers over the years. Meanwhile, regional economic integration has the potential to significantly draw the continent closer to achieving sustainable development goals by significantly reducing poverty, increasing income for all, and increasing productivity. It is on this premise that this study investigates the effect of international trade, regional integration, and their interactive effect on economic growth in African countries.

The study employed the S-GMM dynamic panel model for 40 selected countries across Africa. The findings show that, in the context of increasing the labour force, FDI, government effectiveness, decreasing inflation, the real interest rate, and government debt, regional integration, and international trade, jointly and separately impact positively and significantly on economic growth. The findings align with theories and empirical works that establish a positive relationship between international trade or regional integration and economic growth. These results, therefore, present empirical justification for a continuous push on regional integration in Africa for the attainment of continuous economic growth. It also presupposes that the challenges that prevent or limit international trade and regional integration in Africa, such as, poor transportation infrastructure, customs duties, insecurity, and political instability, amongst others, need to be addressed to optimally benefit from the economic gains of international trade and regional integration in Africa.

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Appendix 1: Justification for Choice of Variables

Variables	Justification
Lag of Real GDP	The lag of the dependent variable is a valid control variable. See Silajdzic & Mehic (2017), Sulaiman & Ramli (2019) Abendin et al. 2021.
Exports (% GDP)	Export is part of the National income accounting framework and is employed as an explanatory variable that determines aggregate output in several works such as Abubakar, A. & Shehu, K. (2015).
Net Exports as (% GDP)	Net exports has the same justification as exports above and could be seen in Javed et al., (2012)
Regional Integration	Kamau (2010), Naveh *et al.* (2012), Tinta *et al.,* (2018) Muriuki and Kosimbei (2015) and Singoro (2021) argue that regional integration is a potential determinant of economic growth.
Labour Force	Cobb Douglass production function supports labour force as a determinant of output Abendin et al. 2021 Goff and Singh (2014) and Umeh *et al.* (2022)
Capital formation (% GDP)	Capital formation is a proxy for investment and determines output in the National Income Accounting framework. See Abubakar, A. & Shehu, K. (2015). Abendin et al. 2021
Private Sector Credit (% GDP)	King and Levine (1993) theoretically posits that financial intermediation (proxied with private sector credit) is a key determinant of aggregate output.
Inflation (CPI)	This is a standard control variable when GDP is the dependent variable as shown by Mongoe & Mongale (2014)
Government Debt	This is a standard control variable when GDP is the dependent variable as shown by Tanzi & Lutz (1991)
FDI (% GDP)	FDI has also been used in similar studies as a standard control variable in empirical works such as Abendin et al. 2021, Bedane et al., (2017).
Real Interest Rate	This is a standard control variable when GDP is the dependent variable as shown by Tanzi & Lutz (1991)
Government Effectiveness	Government effectiveness is a proxy for institutions and its empirical relevance on GDP has been highlighted by studies such as Bedane et al., (2017).