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Intra-African Trade and Macroeconomic Performance of Africa: Implications for the African Continental Free Trade Area¹

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Abstract

The study investigates the influence of intra-African trade on Africa's macroeconomic performance. To mitigate potential biases, the paper employs a two-step estimation technique (2SLS). In the first step, the paper uses Poisson pseudo maximum likelihood (PPML) to estimate the gravity model for intra-African trade. In the second step, the paper uses the 2SLS instrumental variable (IV) estimator to estimate the macroeconomic models. The paper fills a gap in the literature by considering macroeconomic indicators that were previously overlooked, such as inflation, financial market development, and human capital development. In addition to the commonly considered factor, real GDP per capita, the study also captures recent periods between 1990 and 2022. Findings based on the PPML model show that in addition to the real GDP per capita and regional trade agreements (RTAs), the distance between importing and exporting countries, though counterintuitive, significantly affects intra-African trade, whereas sharing the same colonial history and speaking the same language do not necessarily increase trade in the continent. Further, the 2SLS estimates show that intra-African trade exerts a robust positive impact on Africa's GDP per capita, has a modest effect on financial market development, and dampens inflation over the study period. Accordingly, the paper underscores the need for effective implementation of the African Continental Free Trade Area (AfCFTA protocols) to realise the full potential impact of intra-African trade on income, financial development, and reduced inflation in the continent in the medium to long term.

Keywords: AfCFTA, intra-African trade, macroeconomic performance, Poisson pseudo maximum likelihood (PPML), 2SLS instrumental variable (IV) estimator

JEL Codes: D01, C26, C36, F13

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1.0 INTRODUCTION

Africa is infamous for unfavorable macroeconomic performance. This includes high inflation, which worsens socio-economic welfare and hampers the potential of Africa to achieve the United Nations' Sustainable Development Goals on poverty and hunger, and low financial market development, which reduces capital accumulation and eventually, growth sustainability. Several studies have been conducted to identify the causes and potential solutions to the problem of adverse macroeconomic performance in Africa. However, little attention has been paid to the impact of intra-African trade. African countries recently signed an agreement to implement the African Continental Free Trade Area (AfCFTA) to facilitate migration and movement of goods and services across the continent. Classical trade theories have explained the potential of trade to reduce global prices and enhance global economic welfare. These theories emphasise how countries that are relatively disadvantaged at producing a product could benefit from trade through lower prices than they could have had at autarky.

To fill a gap in the literature on factors influencing Africa's macroeconomic performance and generate empirical evidence about the importance of member countries committing to the AfCFTA, this study investigates the effect of intra-African trade on the macroeconomic performance of the continent. Previous studies have largely focused on the influence of the AfCFTA on overall African growth and development. This study departs from the literature by investigating the influence of trade integration on macroeconomic performance, given that macro fundamentals are the channels through which the impact of any trade arrangement spills over to the aggregate regional economy. The channels through which intra-regional trade such as AfCFTA could impact macro fundamentals abound. They include inflation, productivity, and exchange rate dynamics, among others. Since the AfCFTA would remove tariffs and nontariff barriers and facilitate the free movement of goods as well as people, it would have far-reaching effects on lowering transaction costs, and by extension, inflation. Similarly, access to larger markets facilitated by regional integration through trade would also spur higher innovation and productivity.

The main objective of regional trade agreements (RTAs) is to stimulate economic growth in participating countries through increased trade, economies of scale, knowledge, and technology transfer (Gammadigbe 2021). In March 2018, the African Union (AU) established the AfCFTA as part of its long-term development agenda, Agenda 2063. When the AfCFTA is fully implemented, Africa will become a single market capable of increasing the size of the African economy to US\$29 trillion by 2050; accelerating intra-African trade by up to 52.3 percent; and allowing all AU members to benefit from improvements in national welfare, which are expected to be worth about 2.64 percent of the continent's GDP, or about US\$65 billion in 2018 dollars. The AfCFTA also will bring about an increase in real wages for unskilled employees in important industries such as the agricultural and non-agricultural sectors, while carrying the skilled workers along. It will make space for additional dynamic advantages, such as long-term and sustained

development, export diversification, a sizable African market that draws foreign direct investment better (see IMF 2019a; Songwe 2019; World Bank 2020; Oloyede, Osabuohien, and Ejemeyovwi 2021). Put differently, proponents of the AfCFTA have identified several ways by which it can help promote Africa's growth and development, including poverty reduction, employment generation, increased trade facilitation, and increased trade and income.

Meanwhile, trade theories have suggested that free trade arrangements among countries in a geopolitical area will redistribute gains of trade among member countries through trade creation and trade diversion. This implies that benefits from membership in the AfCFTA may be unevenly distributed among members. In fact, there are concerns over the effectiveness of the AfCFTA in driving gains associated with trade integration in Africa given the commonality of goods that these countries specialise in and trade amongst themselves. These concerns were laid bare when the two largest economies in Africa delayed their consent to the agreement. Nonetheless, the effects on Africa are expected to be positive from the socioeconomic perspective. This hypothesis, in line with the projection of the proponents of the AfCFTA, has attracted the attention of researchers who have been studying the socioeconomic effects of enhanced intra-African trade to evaluate the potential effect of full implementation of the AfCFTA on the socioeconomic performance of Africa (see Coulibaly et al. 2018; Fofack 2020; Gnimassoun 2020).

Fofack (2020) describes the outcomes of the preliminary projection of the socioeconomic effects of full implementation of the AfCFTA as having positive and significant growth prospects and development impact (see Saygili et al. 2018; IMF 2019b). He further predicted that there would be an increase in the average GDP of the region by about 0.66 to 0.97 percent annually, an increase in employment, and increases in real wages for both skilled and unskilled labour. Investigating the effect of openness to trade and migration on the growth of African countries, Coulibaly et al. (2018) found evidence that while trade between Africa and industrialised countries has a clear and robust positive impact on Africa's living standards, trade with developing countries fails to be growth-enhancing. Similarly, Gnimassoun (2020) examines the income effect of intra-African trade, with intra-African trade used as a measure of the intensity of regional integration. The results show that African integration only has a positive, significant, and robust impact on real per capita income in Africa in the short and medium terms but not in the long term.

This study has a similar objective to those of Coulibaly et al. (2018) and Gnimassoun (2020), as it examines the economic implication of full implementation of the AfCFTA through intra-African trade. It differs, however, in several ways. First, while Coulibaly et al. (2018) and Gnimassoun (2020) focused on the output or per capita income effect, the current study considers a wider range of macroeconomic indicators, such as inflation, financial development, and human capital development. Hence, it provides a more detailed explanation of the effects of higher intra-African trade intensity and, by implication, full implementation of the AfCFTA on Africa's growth and development. In addition, given the potential of bidirectional causality between trade and

macroeconomic factors and between one macroeconomic factor and another, this study employs endogeneity-consistent methodology. Specifically, it estimates pseudo gravity-based and panel-based regression models over the period 1990 and 2022 and uses instrumental variable (IV) two-stage least squares (2SLS) with estimates from Poisson pseudo maximum likelihood (PPML) as the instrument. This method is similar to that of Gnimassoun (2020), but used in the context of a wider range of macroeconomic indicators.

This study is structured in six sections. Following this introductory section, section 2 presents the literature review and theoretical issues. The background and stylised facts are presented in section 3. Section 4 deals with data issues and methodology. Section 5 presents and discusses results, and section 6 concludes and offers recommendations.

2.0 LITERATURE REVIEW AND THEORETICAL ISSUES

2.1 Theoretical Issues

This study investigates the effect of regional trade or intra-African trade on the macroeconomic performance of region members. The AfCFTA is an arrangement among African countries to increase trading by agreeing to remove tariff and non-tariff barriers to trade. By extension, the AfCFTA will facilitate no visa movement among African countries, thus promoting the free movement of people and goods and facilitating international transactions. This arrangement implies reduced transaction costs and access to a larger market for goods produced. In addition, lower transaction costs will translate into reduced prices of goods (lower inflation rate), and access to a larger market for goods produced is expected to translate into increased productivity (GDP growth) across African countries. If the Keynesian idea that demand creates its own supply holds, then access to a larger market is expected to stimulate innovation in the productive sector, leading to higher human capital development, and innovation in the international payment system, leading to higher financial market development.

Trade theories have discussed potential gains from trade for any two countries under different production and demand conditions. These include the theories of absolute cost advantage, comparative cost advantage, and the new trade theory. According to the absolute cost advantage theory, trade between countries will increase global output and productivity when each country specialises, produces, and exports the goods they are endowed with and can produce more of than any other country, given the same cost and technology. In the same vein, comparative cost advantage theory states that trade will reduce the global cost of production if each country can specialise, produce, and trade in the goods it can produce at lower comparative cost than any other country. The comparative trade theory explains that even if a country has an absolute advantage in producing two commodities, it should specialise and produce the one it can produce with the least comparative disadvantage and leave the production of other goods for another country (see Maneschi 1992; Lefeber 2000). The classical trade theories further established potential gains

from trade between related economies [high-income or low-income countries] and unrelated economies [i.e., low-income and high-income countries]. Other traditional trade theories, such as the Heckscher-Ohlin theorem, the Stolper-Samuelson theorem and the Rybczynski theorem, and new trade theory also explain gains from trade as having the potential to increase global output and reduce global prices, but with different explanations on the basis for trade, other than endowment (see Gandolfo and Gandolfo 1986; Lloyd 2011). The endogenous growth literature asserts that trade openness positively affects per capita income and growth through economies of scale and technological diffusion between countries (Dufrenot et al. 2010).

2.2 Empirical and Methodological Review

Most empirical studies have focused on investigating the effect of trade on output growth, with little attention paid to how trade affects other macroeconomic factors (see, for example, Arodoye and Iyoha 2014; Tsegaye 2015; Dufrenot et al. 2010; Burange et al. 2019; Fatima et al. 2020; Gammadigbe 2021; Omoke and Opuala–Charles 2021; and Tripathi 2023). Overtly, most of these studies found an association and a significant positive relationship between trade openness and economic growth, employing different methodologies to establish the trade-led growth hypothesis in individual and group of countries cases. Regarding studies on single-country cases, Arodoye and Iyoha (2014) examine the nexus between foreign trade and economic growth in Nigeria using quarterly time-series data for 1981Q1 through 2010Q4. Their findings reveal a stable, long-run relationship between foreign trade and economic growth. Tsegaye (2015) uses the VAR model and time series data between 1960 and 2010 and found unidirectional causality running from exports to economic growth in Korea and causality for imports in Korea was bi-directional with economic growth. Similarly, Omoke and Opuala–Charles (2021) show that export trade has a significant positive impact on economic growth using autoregressive distributed lag (ARDL), while the impact of import trade on economic growth is negative and significant.

For multiple country cases, most studies focus on external trade generally and not regional trade, which has implications for regional trade arrangements like the AfCFTA. Dufrenot et al. (2010) examine the relationship between openness and growth for 75 developing countries in the period 1980–2006. They address parameter heterogeneity in the trade-growth relationship by employing a quantile regression analysis. They find that while low-growth countries can benefit the most from openness in the long run, they are also likely to suffer the most from the short-run effects of openness. Burange et al. (2019) analyze a causal relationship between trade openness and economic growth for the member countries of BRICS (Brazil, Russia, India, China, South Africa, Iran, Egypt, Ethiopia, and the United Arab Emirates) using time series analysis. The study supports the growth-led export and growth-led import hypothesis for China and export- and import-led growth for South Africa. Fatima et al. (2020) investigate the role of human capital in the impact of trade openness on GDP growth. Employing a generalised method of moments (GMM), an estimator developed for dynamic panel data models, the results outline an intriguing indirect relationship between trade openness and GDP growth. When human capital accumulation

(HCA) is considered as an intervening variable, trade may hurt GDP growth when countries exhibit a low level of HCA. Tripathi (2023) examines the relationship between trade openness and economic growth for the G20 countries using Salvatore's (1983) simultaneous equations model. The results suggest a positive relationship between trade and growth.

Studies that considered trade openness from the regional or intra-regional trade perspective include Gnimassoun (2020) and Gammadigbe (2021). Gnimassoun (2020) investigates the impact of intra-African trade on real per capita income in Africa, with intra-African trade used as a measure of the intensity of regional integration. A gravity-based, two-stage least-squares strategy is used to address the potential endogeneity problem. The results show that, from a long-term perspective, African trade integration has not been strong (weak) enough to generate a positive, significant, and robust impact on real per capita income in Africa. Similarly, Gammadigbe (2021) examines the contribution of regional trade integration (RTI) to economic growth and income convergence in Africa and its major regional economic communities (RECs) using panel data over the period 1979–2018. The instrumental variable and panel fixed-effects estimation results show that RTI promotes African economic growth. It, however, fosters income divergence, reflecting the distribution of the gains from regional integration in favor of the continents' more developed economies.

Another macroeconomic indicator whose impact on trade has been investigated is inflation. Investigation into the impact of trade openness on inflation became popular after the study by Romer on trade-inflation nexus, which concluded that trade openness reduces inflation (see Romer 1993). Relevant studies can be categorised under country-specific and countries-group cases. Examples of country-specific studies include Sakanko and Joseph (2019) and Mukhtar et al. (2019), while examples of countries-group studies are Aliyev and Gasimov (2014), Nazari et al. (2022) and Haryani et al. (2022). The literature reveals mixed results. While many studies confirm Romer's hypothesis on the negative effect of trade on inflation, few studies find a direct effect. Notably, Sakanko and Joseph (2019) examine the effect of trade openness on the inflation rate in Nigeria. The ARDL cointegrating result shows that there is a short-run and long-run significant negative relationship between the inflation rate and trade openness in Nigeria. Mukhtar et al. (2019) examine the asymmetric relationship between inflation and trade openness in Pakistan over the period 1972–2016 using the nonlinear autoregressive distributed lag technique. Their result invalidates Romer's (1993) proposition that inflation tends to decline as trade openness increases, as it shows an asymmetric and positive relationship in the short run and a symmetric positive relationship in the long run.

Regarding country-group studies, Aliyev and Gasimov (2014) investigate the openness-inflation nexus in South Caucasus region countries, Georgia, Armenia, and Azerbaijan, separately for the period 1996–2012. The findings provide no significant impact of openness on inflation in any region country, except partially Georgia. Nazari et al. (2022) examine the effect of trade

liberalization on the inflation of eight precursor economies of East Asia during 1990–2016. The results confirm the Romer (1993) hypothesis, which finds a negative relationship between inflation and trade openness. The effect of income per capita on inflation is negative, but the liquidity volume coefficient is positive. Haryani et al. (2022) examine the impact of international commerce on the economic growth of ASEAN’s founding countries, Indonesia, Malaysia, the Philippines, Singapore, and Thailand, since the inception of the ASEAN body 53 years ago (1968–2020). The panel data approach shows that the exchange rate significantly mediates international trade (proxied by export and import activity), and the inflation rate negatively affects economic growth.

Human capital is an important factor in economic growth and development. Many studies have evaluated this hypothesis, established by the Solow growth model (see, for example, Loli-Poma et al. 2021; Wirajing 2023). However, despite the endogenous growth model taking human capital as an endogenous variable, limited studies exist on the determinants of human capital. Trade may be expected to increase human capital development through economies of scale and technology diffusion that trade agreement tends to promote. A pertinent study is the recent work by Oloke et al. (2022) on the nexus between foreign capital inflows and human capital development in Nigeria from 1990 to 2020. It finds that trade openness has a negative and significant relationship with human capital development. However, this is a country-specific study whose findings may differ from those of a group of countries bound by trade agreements, as proposed in this study. Like the trade-human capital literature, trade-financial development literature is also emerging. A relevant study by Fagbemi et al. (2023) found that the magnitude and direction of the effect of trade on financial development are sensitive to the quality of institutions.

Hence, this study will complement studies on the trade-growth nexus by considering trade openness from the view of regional trade-organised countries in the context of the AfCFTA. It will consider intra-African trade rather than African countries’ trade with the rest of the world. From this view also, this study will examine the impact of trade on inflation, financial development, and human capital development in Africa.

3.0 BACKGROUND AND STYLISTED FACTS

Although African countries are endowed differently with unique qualities of human, technology, and natural resources, they seem to have common economic development challenges ranging from high poverty, high public debt profiles, high inflation, and unemployment, among others. Over the years, the countries in different regions of Africa have had to cooperate to promote economic integration as a strategy, to promote economic transactions in their region and fight their common economic problems. Currently, Africa has about eight recognised RECs. These are the Arab Maghreb Union (UMA), the Common Market for Eastern and Southern Africa (COMESA), Community of Sahel–Saharan States (CEN–SAD), the East African Community (EAC), the Economic Community of Central African States (ECCAS), the Economic Community

of West African States (ECOWAS), the Intergovernmental Authority on Development (IGAD), and the Southern African Development Community (SADC). While each of them is doing well in their respective regions, the organization of 54 countries in Africa came together through the AU to promote one united free trade agreement for Africa, which led to the launching of the AfCFTA in March 2018. The free trade area is the largest in the world in terms of the number of participating countries since the formation of the World Trade Organization. The Secretariat of AfCFTA is in Accra, Ghana, commissioned and handed over to the AU by the President of Ghana, Nana Akufo-Addo, on August 17, 2020, in Accra.³

3.1 Low Intra-African Trade

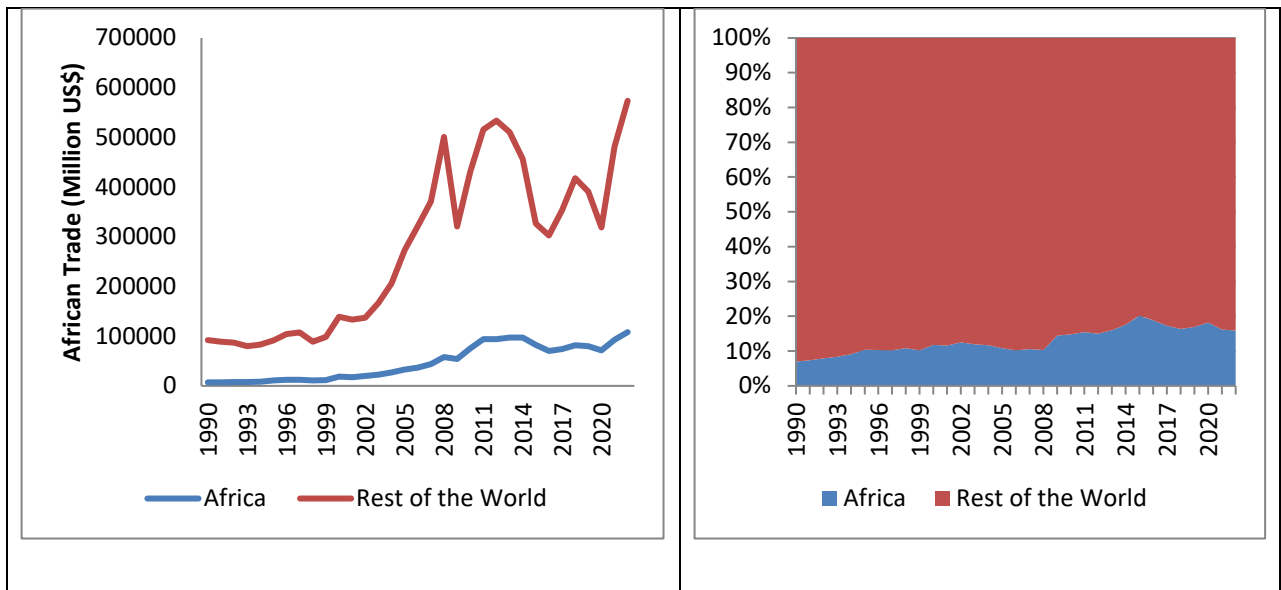
Available data show that intra-Africa trade is low and has not increased significantly since the launching of AfCFTA in May 2019. Figure 1 shows the trend in intra-Africa trade vis-à-vis Africa's trade with the rest of the world. Panel A shows that intra-Africa trade was about US\$ 6.9 billion, while inter-African trade was about US\$ 91.6 billion in 1990. Both intra-African trade and inter-African trade increased gradually between 1990 and 2000, as intra-African trade increased to US\$18.4 billion and inter-African trade increased to US\$139 billion by 2000. In the 2000s through 2022, intra-African trade increased gradually, reaching US\$92.8 billion, while African trade with the rest of the world increased rapidly, reaching US\$481.2 billion. The percentage of intra-African trade to African trade with the rest of the world is presented in Panel B. The figure shows that intra-African trade was only about 7 percent of total African trade in 1990. This increased gradually to 11.7 percent by 2000.

The year that intra-African trade contributed most to Africa's regional trade was 2015, when intra-African trade was about 20.17 percent of total African trade. This sharp rise in intra-African trade during this period was not real, as it was attributed to the fall in the price of commodities such as crude oil during this period. The value of intra-African trade and African trade with the rest of the world fell during this period, suggesting that the higher percentage of intra-African trade was not due to higher trade among African countries but rather to lower trade with the rest of the world at a higher proportion than the rate of fall in intra-Africa trade during this period. Meanwhile, intra-African trade has been falling gradually since 2015, reaching 15.85 percent in 2022. This occurred despite the launching of the AfCFTA in May 2019. Thus, the AfCFTA has not been influencing the trade behaviour of African countries.

Figure 1. Intra- and inter-Africa area trade (1990–2022)

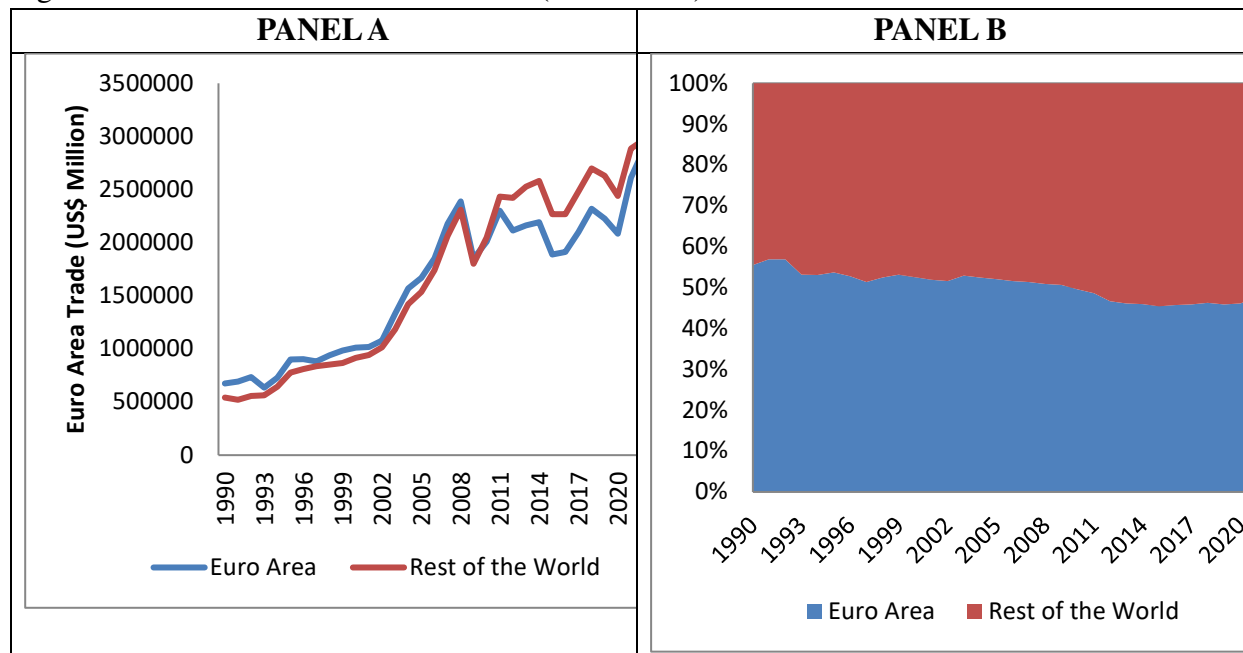
PANEL A	PANEL B
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³ See: <https://www.cbn.gov.ng/MonetaryPolicy/afcfta.asp>



Source: Author's elaboration from the IMF Direction of Trade Statistics (DOS) Data.

Figure 2. Intra- and inter-Euro area trade (1990–2022)



Source: Author's elaboration from the IMF Direction of Trade Statistics Data.

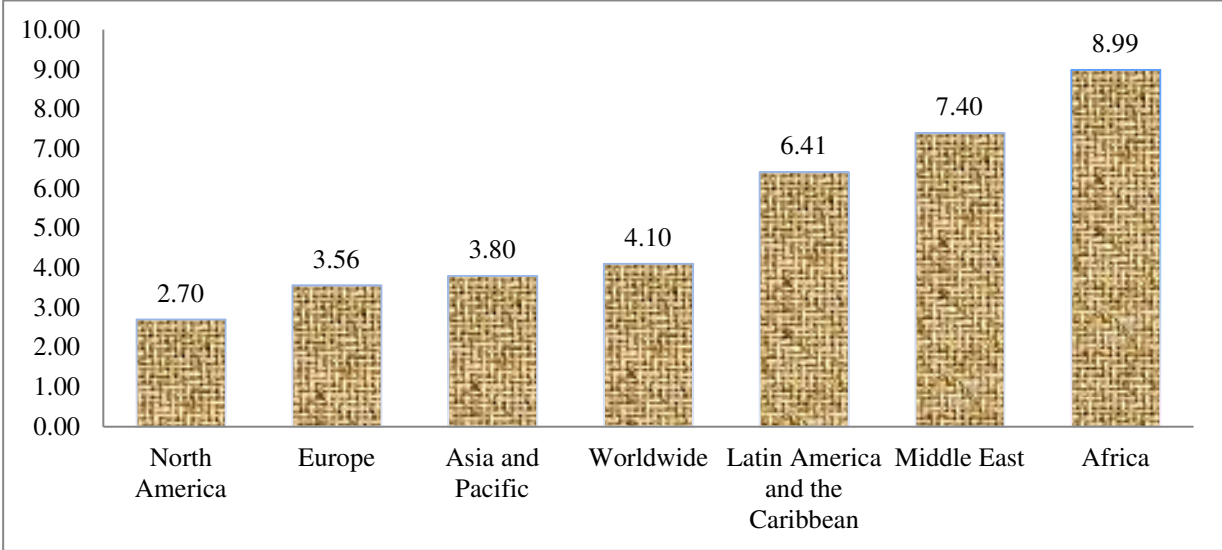
Meanwhile, as can be seen in figure 2, trade among European countries is high. Panel 1 shows that intra-Euro Area trade was about US\$673.4 billion in 1990, while intra-African trade volume was a paltry US\$6.9 billion in the same period. Between 1990 and 2000, when intra-African trade increased to US\$18.4 billion, intra-Euro Area trade increased to US\$1.01 trillion. As revealed in the figure (Panel A), both intra-Euro Area trade and inter-Euro Area trade increased gradually over time to remain at US\$2.88 trillion and US\$2.97 trillion, respectively. Another point is that trade with European countries and trade with the rest of the world are very close, but intra-Euro

Area trade was higher than Euro Area trade with the rest of the world before 2009. As may be observed from the percentage presentation in Panel B, Euro Area trade was largely above 50 percent before 2009. It fell below 50 percent to 49.49 percent in 2010 and remained at 49.24 percent in 2022. This seems to suggest that African countries can do better in terms of trading within the region to aid the development of the region. Onyekwena and Oloko (2016) identified problems such as inadequate infrastructural development, barriers to trade, and product concentration or lack of product complementarity as factors hindering intra-regional trade in Africa. As proper implementation of the AfCFTA is expected to increase intra-African trade, appropriate methods to deal with these factors would need to be addressed.

3.2 African Macroeconomic Performance

Africa has been notorious for unfavorable macroeconomic performance. High inflation worsens socio-economic welfare and hampers the continent’s potential to achieve the Sustainable Development Goals on poverty and hunger and financial market development. This, in turn, reduces capital accumulation and, eventually, growth sustainability.

Figure 3. Africa and global inflation by region (1990–2022)

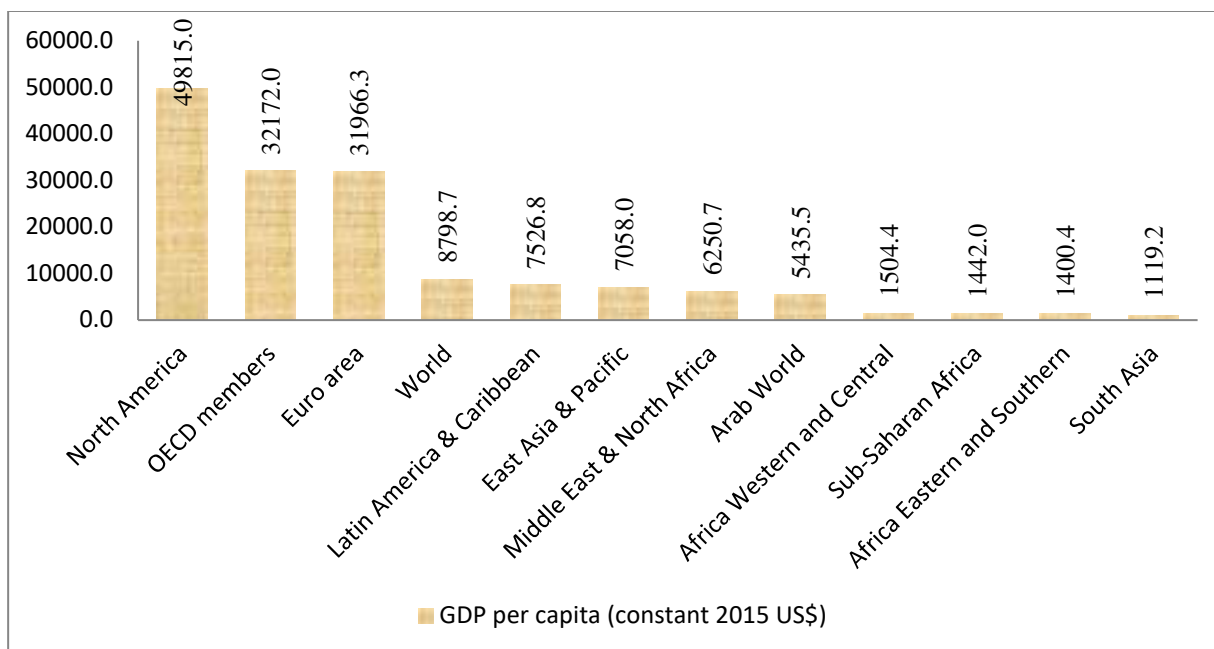


Source: International Monetary Fund data.

3.2.1 High inflation

Figure 3 shows the average inflation rates of different economic regions and global average inflation between 1990 and 2022. It is evident from the figure that Africa has the highest average inflation in the world, while North America has the lowest. It is also clear that inflation rates in Latin America, the Middle East, and Africa are higher than the global average, but North America, Europe, and Asia-Pacific have inflation rates lower than the global average.

Figure 4. GDP per capita, 1990–2022 (in constant 2015 US\$)



Source: World Development Indicators.

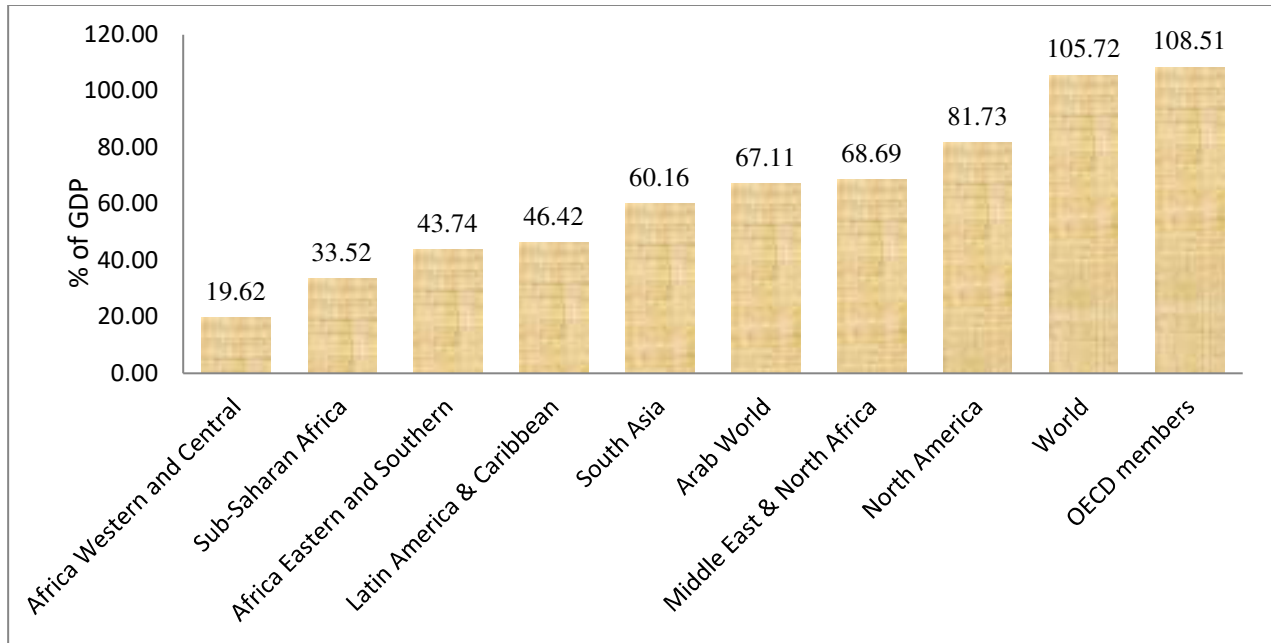
3.2.2 Low GDP per Capita

Figure 4 shows the average GDP per capita (in constant 2015 US\$) for different regions and the world GDP per capita average between 1990 and 2022. As can be seen in the figure, African regions have overly low income per capita. Western and Central Africa, Sub-Saharan Africa, and Eastern and Southern Africa have GDP per capita lower than the world average. Other countries with lower GDP per capita below the world average but higher than the African average include Latin America and the Caribbean, and East Asia and the Pacific. Meanwhile, North America, OECD countries, and the Euro Area have higher per capita incomes than the world average.

3.2.3 Low Financial Market Development

Africa also has low financial market development. Evidence from figure 5 shows that Africa is among the regions that have the least developed financial markets (represented by a broad money percentage of GDP). In the figure, the sub-Saharan African region has less financial development than other regions like Latin America and the Caribbean, South Asia, and the Arab World. In sub-Saharan Africa, Africa's Western and Central regions have lower financial development than the African Eastern and Southern regions. Middle East and North Africa, however, have high financial development, close to North America and the OECD countries.

Figure 5. Financial market development in Africa and the world, 1990–2022



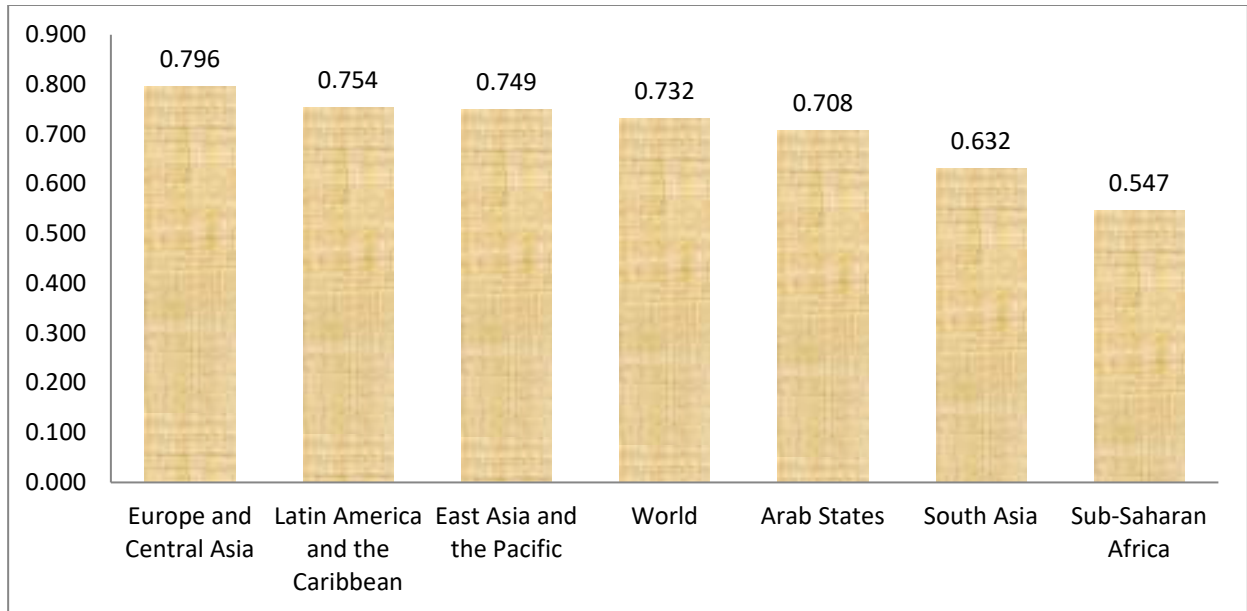
Source: World Development Indicators.

3.2.4 Low Human Capital Development

The United Nations Development Programme (UNDP)'s Human Development Index is a composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge, and a decent standard of living.⁴ Figure 6 shows that human development in Africa is not only below the world average, but also the lowest compared with five other regions (Europe and Central Asia, Latin America and the Caribbean, East Asia and the Pacific, Arab States, and South Asia). Other regions with human development levels below the world average are the Arab States and South Asia. Three other regions—Europe and Central Asia, Latin America and the Caribbean, and East Asia and the Pacific—have human development levels above the world average.

Figure 6. Human development in Africa and the world

⁴ See Technical note 1 at http://hdr.undp.org/sites/default/files/hdr2022_technical_notes.pdf for details on how the HDI is calculated.



Source: United Nations Development Programme documentation and downloads.

4.0 METHODOLOGY AND DATA ISSUES

4.1 Methodology

Trade can influence macroeconomic performance, giving rise to phenomena such as imported inflation, external macroeconomic and financial shocks, and the trade-growth nexus. Macroeconomic performance can also influence trade, giving rise to the income-trade nexus, among others. This signifies the potential for bi-directional causality between trade and macroeconomic performance, which may result in the problem of endogeneity (see Gnimassoun 2020). Endogeneity can arise due to measurement errors, potential reverse or bidirectional causality, as well as omission of unobserved factors that can be correlated with the error term (Ehrhart et al. 2014; Beine and Parson 2015; Bovi and Elias 2017). This will render the ordinary least squares (OLS) model estimation biased and inconsistent.

To avoid estimation bias due to potential endogeneity problems, we follow the approach by Gnimassoun (2020) by carrying out our empirical analysis in two stages. The first stage estimates the factors influencing bilateral trade between African countries, while the second stage focuses on the main objective of this study by estimating the impact of intra-African trade and other relevant factors on relevant macroeconomic factors in Africa, mainly, real GDP per capita, inflation, financial market development, and human capital development.

We employed the PPML in the first stage to estimate the gravity model for intra-African trade. The predicted intra-African trade series from the PPML model was used as an instrument in the second stage, while the 2SLS instrumental variable approach was used to examine the impact of intra-African trade on relevant macroeconomic indicators. The PPML estimator was identified as

an efficient way to deal with the zero trade flows in gravity models and problem of heteroscedasticity (see Silva and Tenreyro 2006; Martinez-Zarzoso 2013; Alemayehu and Edris 2015; Geda and Yimer 2019; Gnimassoun 2020). Both approaches are suitable for correcting endogeneity problems and possess other features, such as correcting for possible omissions and errors in variables (Wooldridge 2010). Also, based on its extensive consideration of geographical factors, the gravity model has usually been employed in estimating the drivers of bilateral trade between country i and country j . The bilateral trade model is specified as follows (see also Gnimassoun 2020).

$$\ln \text{bitrade}_{ij} = \beta_0 + \beta_1 \ln RYPC_i + \beta_2 \ln RYPC_j + \beta_3 \ln Pop_i + \beta_4 \ln Pop_j + \beta_5 \ln Dist_{ij} + \beta_6 \text{Colony}_{ij} + \beta_7 \text{Landlocked}_j + \beta_8 \text{Border}_j + \beta_9 \text{Lang}_j + \beta_{10} \text{RTA}_{ij} + \varepsilon_j \quad (1)$$

where bitrade_{ij} is bilateral trade between African countries representing intra-African trade; $RYPC_i$ and $RYPC_j$ are real GDP/income per capita for the receiving and exporting countries, respectively, and Pop_i and Pop_j are population size of the receiving and exporting countries, respectively. Others are gravity and geographical factors. These include a dummy for distance ($Dist_{ij}$) between the receiving and exporting countries, a Landlock_j dummy for the landlocked exporting country, a Colony_{ij} dummy for receiving and exporting countries that have a common colonial history, a Border_{ij} dummy for importing and exporting countries that share the same border, Lang_{ij} dummy for importing and exporting countries that share a common official language, and RTA_{ij} for importing and exporting countries that belong to the same RTA. Although this model is usually specified and estimated with a cross-sectional regression model, we further estimate it with a panel regression model to examine the short- to medium-term relationship between intra-African trade and its determinants (see also Gnimassoun 2020).

After the estimation of the gravity regression in equation (1), the paper aggregates the explanatory variables of the model over the destination countries j to obtain the predicted intra-African trade calculated as $\text{bitrade}_{ij} = \sum_{i \neq j} \exp(\Gamma_{\text{bitrade}} Z_{ij})$, where Z_{ij} is the vector of explanatory variables and Γ_{bitrade} is the vector of the parameters in the bilateral intra-African equation, equation 1. The predicted intra-African trade is then used as an instrument in the 2SLS model for estimating intra-African trade and other factors as the determinants of macroeconomic performance in Africa.

Based on the objective to examine the effect of intra-African trade on four distinct macroeconomic indicators (real GDP per capita, inflation, financial market development and human capital development), this study has four empirical models. Meanwhile, each model is estimated with a panel regression model and cross-sectional regression model to determine their short- to medium-term and long-term relationship, respectively. In addition, for sensitivity and robustness analysis, we engage in gradual augmentation of the estimation model such that we have four different model specifications. These range from the baseline model with intra-African

trade and relevant gravity model variables such as distance and population (model 1), to model 1 augmented with capital stock (model 2), model 2 augmented with historical and geographical factors; colony and landlocked (model 3), and model 3 augmented human and macroeconomic development indicators. For example, the panel and cross-sectional regression models for intra-African trade—real GDP per capita model—is specified as below:

Model 1:

$$\ln RYPC_j = \beta_0 + \beta_1 \ln \text{bitrade}_{ij} + \beta_2 \ln \text{Dist}_{ij} + \beta_3 \ln \text{Pop}_j + \varepsilon_j \quad (2a)$$

Equation (2a) is for the baseline model (Model 1), where $RYPC_j$ is the real GDP per capita (GDPPC) for exporting countries, Trade_{ij} is the bilateral trade between African countries (intra-Africa trade), Dist_{ij} is the distance between exporting and importing countries and Pop_j is the population of the exporting countries. Models 2 to 4 are presented as below:

Model 2:

$$\ln RYPC_j = \beta_0 + \beta_1 \ln \text{bitrade}_{ij} + \beta_2 \ln \text{Dist}_{ij} + \beta_3 \ln \text{Pop}_j + \beta_4 \ln \text{Kstock}_j + \varepsilon_j \quad (2b)$$

Model 3:

$$\ln RYPC_j = \beta_0 + \beta_1 \ln \text{bitrade}_{ij} + \beta_2 \ln \text{Dist}_{ij} + \beta_3 \ln \text{Pop}_j + \beta_4 \ln \text{Kstock}_j + \beta_5 \text{Colony}_{ij} + \beta_6 \text{Landlocked}_j + \varepsilon_j \quad (2c)$$

Model 4:

$$\ln RYPC_j = \beta_0 + \beta_1 \ln \text{bitrade}_{ij} + \beta_2 \ln \text{Dist}_{ij} + \beta_3 \ln \text{Pop}_j + \beta_4 \ln \text{Kstock}_j + \beta_5 \text{Colony}_{ij} + \beta_6 \text{Landlocked}_j + \beta_7 \ln \text{CPI}_j + \beta_8 \ln \text{EXR}_j + \beta_9 \ln \text{BRM}_j + \beta_{10} \ln \text{HCD}_j + \varepsilon_j \quad (2d)$$

where Kstock is capital stock, CPI_j represents consumer prices of exporting country, EXR_j is the exchange rate, broad money, BRM_j , measures financial market development, and HCD is human capital development. The variables with prefix \ln are logged variables. Similar specification goes for other macroeconomic indicators, and the panel specification goes with addition of subscript t to the j subscript (see also Gnimassoun 2020).

4.2 Data Issues

The study covering the periods between 1990 and 2022 employs data from different sources, including the United Nations World Development Indicators (WDI), Penn World, and the International Monetary Fund's Direction of Trade Statistics (DOTS) website. Basically, real GDP per capita, consumer price index, broad money, and exchange rate data are obtained from the WDI; bilateral (intra-African) trade data are obtained from the DOTS database. Other relevant data, such as capital stock data, are collected from the Penn World Tables (PWT version 10.1), Human Development Index data are from the UNDP HDR21–22 Statistical Annex, while data for

gravity models or bilateral variables are from the CEPII database. Data on bilateral migration are available for each five-year period starting in 1990. Hence, this study averaged the variables over seven periods (1990, 1995, 2000, 2005, 2010, 2015, and 2020) to conduct a cross-sectional regression analysis explaining the long-term relationship between the dependent and the independent variables. Following the recent study by Gnimassoun (2020), the study also conducts panel regression analysis to explain the short- to medium-term relationship between the dependent and the independent variables. Details of the data employed are presented in Appendix 1.

5.0 RESULTS PRESENTATION AND DISCUSSION

This section presents and discusses the analysis of the impact of intra-African trade on Africa's macroeconomic indicators, including real GDP, the inflation rate, financial market development, and human capital development. Given that this captures the short- to medium-term and long-term effects, the results from the panel and cross-sectional regression models are presented, respectively. In our two-step estimation technique, a PPML estimator is used on the gravity model for determining the drivers of intra-African trade, and a 2SLS instrumental variable approach is used for the main analysis with projected trade from the first stage used as instrument in the 2SLS model.

To start with, the descriptive statistics for the variables are presented in table 1. The table summarises that 32 trade pairs of African countries are considered. This is evident in the number of observations in Panel A for cross-sectional data. The number of observations in Panel B for panel data is 224, suggesting that the 32 pairs of countries are observed over seven periods (1990–1994; 1995–1999; 2000–2004; 2005–2009; 2010–2014; 2015–2019; and 2020–2022). Since the complete panel gives 224 observations, it shows that intra-African trade and the GDP per capita of exporting and importing countries have few missing observations. Continuous variables such as intra-African trade, the population of exporting and importing countries, GDP per capita of exporting and importing countries, exchange rate, consumer price index, and broad money, among others, are log-transformed, while discrete variables landlocked, colony, border, language, and RTA are not log-transformed.

Table 1. Descriptive statistics

Panel A: Cross-sectional Data					
	Mean	Std. Dev.	min	max	N
<i>Lnbitrade</i>	2.294	2.378	-3.939	6.652	32
<i>LnGDPPC_imp</i>	.133	.418	-0.609	.764	32
<i>LnGDPPC_exp</i>	.313	.659	-0.730	2.106	32
<i>LnPopulation_imp</i>	9.898	.569	9.078	11.022	32
<i>LnPopulation_exp</i>	9.283	1.542	6.164	11.928	32
<i>LnEXR</i>	5.531	1.412	0.144	6.574	32
<i>LnCPI</i>	4.571	.164	4.260	4.968	32
<i>LnBRM</i>	3.231	.382	2.307	4.347	32
<i>HDI</i>	.548	.071	0.404	.718	32
<i>LnDist</i>	6.914	.83	4.707	8.483	32
<i>Landlocked</i>	.125	.336	0.000	1	32
<i>Colony</i>	.469	.507	0.000	1	32
<i>Border</i>	.438	.504	0.000	1	32
<i>Lang</i>	.563	.504	0.000	1	32
<i>RTA</i>	.625	.492	0.000	1	32
Panel B: Panel Data					
<i>Lnbitrade</i>	1.304	3.219	-7.417	7.406	221
<i>LnGDPPC_imp</i>	-.247	.783	-2.010	1.626	219
<i>LnGDPPC_exp</i>	-.087	1.01	-2.010	2.425	223
<i>LnPopulation_imp</i>	9.856	.63	8.592	11.418	224
<i>LnPopulation_exp</i>	9.248	1.541	5.913	12.249	224
<i>LnEXR</i>	4.969	3.361	-19.850	7.56	224
<i>LnCPI</i>	3.933	3.048	-21.607	6.261	224
<i>LnBRM</i>	3.184	.485	1.248	4.846	224
<i>HDI</i>	.523	.085	0.296	.739	224
<i>LnDist</i>	6.913	.819	4.691	8.483	224
<i>Landlocked</i>	.125	.331	0.000	1	224
<i>Colony</i>	.469	.50	0.000	1	224
<i>Border</i>	.438	.497	0.000	1	224
<i>Lang</i>	.563	.497	0.000	1	224
<i>RTA</i>	.625	.485	0.000	1	224

Source: Researcher's computation.

Table 2 presents the gravity model results for intra-African trade using a panel and cross-sectional modelling approach to determine the short- to medium term and long-term effects of the different factors on intra-African trade. Accordingly, the table shows that the income per capita of importing countries is more significant than the income per capita of exporting countries as

determinants of intra-African trade. This holds both in the short- to medium-term and the long-term periods. Also, populations of importing and exporting countries are significant determinants of intra-African trade, particularly in the short- to medium-term period. Distance between importing and exporting countries is also a significant driver of intra-African trade. Although counterintuitive, it implies that the distance between capital territories increases rather than reduces African trade. This effect is, however, not sustained, as there is no significant effect of distance on intra-African trade, as revealed by the cross-sectional estimation result.

Table 2. Results of gravity model estimations

VARIABLES	Panel regression		Cross-sectional regression	
	PPML	OLS	PPML	OLS
LnGDPPC_imp	0.602*** (0.128)	48.13*** (10.06)	0.746** (0.356)	47.88* (25.61)
LnGDPPC_exp	0.317 (0.343)	6.529 (25.52)	1.195 (0.789)	37.46 (92.96)
LnPopulation_imp	0.408* (0.219)	40.33** (18.93)	0.860 (1.037)	76.44 (104.4)
LnPopulation_exp	0.424*** (0.159)	22.93 (14.66)	0.787* (0.448)	10.89 (49.83)
LnDist	0.755*** (0.286)	58.85** (26.73)	0.688 (0.623)	61.22 (65.27)
Colony	0.651 (0.545)	-71.57 (56.61)	0.828 (1.402)	-51.84 (139.4)
Landlocked	-1.286*** (0.434)	-78.08 (51.26)	-1.135 (0.921)	-86.75 (122.2)
Border	0.946** (0.369)	74.47** (37.39)	0.871 (0.819)	71.43 (89.05)
Lang	-0.709 (0.492)	64.66 (48.63)	-0.571 (0.887)	58.06 (114.6)
RTA	2.429*** (0.492)	119.8*** (37.07)	2.819*** (1.046)	123.9 (86.75)
Constant	-12.21*** (3.693)	-930.9*** (344.1)	-22.64** (11.11)	-1,287 (1,113)
Observations	218	218	32	32
R-squared	0.378	0.258	0.525	0.309
Regional effect	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes
LogL	-12061	-1431	-1406	-201.3
F-test		7.216		0.939

Prob > F 9.49e-10 0.519

Source: Researcher’s computation.

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Moreover, having the same colonial history and speaking the same language do not necessarily increase intra-African trade. That is, Colony and Lang do not have significant short- to medium term and long-term effects on intra-African trade. Meanwhile, importing and exporting countries’ affiliation with the same RTA has a strong, positive, and statistically significant impact on intra-African trade in the short- to medium and long-term periods. This suggests that intra-African trade will increase when all African countries belong to a common trade area, as enunciated by the AfCFTA.

The results of the gravity model fit well with some well-known stylised facts (effect of distance, per capita income, landlocked, RTA, population) and are consistent with those of previous studies (Frankel and Romer 1999; Ortega and Peri 2014; Coulibaly, Gnimassoun, and Mignon 2018; Geda and Yimer, 2023). For instance, Gnimassoun (2020) and Geda and Yimer (2023) establish the negative effect of distance on trade and that landlocked countries are naturally much less open to trade. Thus, our gravity-based predictors are very successful at explaining bilateral intra-African trade.

Tables 3–10 present the results of the effect of intra-African trade on macroeconomic factors. They basically present the results for four different models. The first or baseline model is based on intra-African trade and relevant gravity model factors such as distance and population. The second model augments the first model with the introduction of a key productive factor, capital stock; the third model augments the second model with the addition of historical and geographical factors as control variables, while the fourth model augments the third model with the addition of human and macroeconomic development factors.

Table 3 shows the result for the impact of intra-African trade on real GDP per capita of Africa. The result shows that intra-African trade has a positive and statistically significant impact on intra-African trade. This result is consistent, robust, and insensitive to different model specifications. This implies that the higher the intra-African trade, the higher the African countries’ real GDP per capita. This suggests that good coordination and implementation of the AfCFTA can potentially ameliorate people’s suffering in Africa by increasing their income in the short- to medium-term period.

Table 3. Short- to medium-term impact of intra-Africa trade on real GDP per capita

VARIABLES	(1) PN-IV1	(2) PN-IV2	(3) PN-IV3	(4) PN-IV4
Intra-African Trade	0.00773***	0.00641***	0.00638***	0.00280***

	(0.00163)	(0.00168)	(0.00162)	(0.000856)
Distance	0.224	0.257**	0.273**	0.0655
	(0.140)	(0.122)	(0.133)	(0.0694)
Population	-0.372***	-0.630***	-0.614***	-0.599***
	(0.106)	(0.136)	(0.167)	(0.0933)
Capital Stock		0.315**	0.312*	0.486***
		(0.145)	(0.161)	(0.0894)
Colony			0.0671	0.218*
			(0.232)	(0.132)
Landlocked			-0.00890	0.618***
			(0.335)	(0.194)
Inflation				0.182***
				(0.0540)
Exchange Rate				-0.203***
				(0.0483)
Financial Market Dev.				0.141
				(0.121)
Human Development				3.211***
				(0.443)
Constant	1.231	0.332	0.0753	1.703*
	(1.485)	(1.395)	(1.579)	(0.933)
Observations	218	218	218	218
R-squared				0.547
Regional effect	Yes	Yes	Yes	Yes
Year effect	No	No	No	No

Source: Researcher's computation.

Note: PN-IV1 is the baseline model estimated with a 2SLS instrumental variable estimator; PN-IV2 is the baseline model augmented with factor input, PN-IV3 is the baseline model augmented with factor input and historical and geographical control variables, and PN-IV34 is the baseline model augmented with factor input, historical, and geographical control variables, and other control variables. Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Meanwhile, evidence from table 4, the cross-sectional data model, revealed that intra-African trade is positive but not statistically significant. This suggests that intra-African trade potential to boost the real income of Africans and reduce the poverty rate is not a long-term phenomenon. Thus, this study concludes that intra-African trade has a short- to medium-term positive significant impact but no long-term significant impact on the GDP per capita of Africa. This result partly confirms the findings of Gnimassoun (2020), which explains that, from a long-term perspective, African trade integration has not been strong enough to generate a positive, significant, and robust impact on real per capita income in Africa. It also confirms the finding by Gammadigbe (2021), which concludes that RECs promote economic growth in Africa.

Table 4. Long-term impact of intra-Africa trade on real GDP per capita

VARIABLES	(1) CS-IV1	(2) CS-IV2	(3) CS-IV3	(4) CS-IV4
Intra-African Trade	0.00545 (0.00334)	0.00437 (0.00337)	0.00398 (0.00309)	0.00168 (0.00120)
Distance	0.101 (0.225)	0.119 (0.196)	0.141 (0.204)	0.0519 (0.0908)
Population	-0.294 (0.183)	-0.490** (0.228)	-0.419 (0.273)	-0.118 (0.160)
Capital Stock		0.237 (0.243)	0.202 (0.258)	0.0232 (0.179)
Colony			0.107 (0.360)	0.167 (0.178)
Landlocked			-0.206 (0.531)	0.323 (0.272)
Inflation				0.916 (0.789)
Exchange Rate				0.0196 (0.101)
Financial Market Dev.				-0.157 (0.241)
Human Development				4.721*** (0.804)
Constant	1.951 (2.415)	1.328 (2.252)	0.880 (2.434)	-0.337 (3.653)
Observations	32	32	32	32
R-squared				0.758
Regional effect	Yes	Yes	Yes	Yes
Year effect	No	No	No	No

Source: Researcher's computation.

Note: CS-IV1 is the baseline model estimated with 2SLS instrumental variable estimator; CS-IV2 is the baseline model augmented with factor input; CS-IV3 is the baseline model augmented with factor input and historical and geographical control variables, and CS-IV34 is the baseline model augmented with factor input, historical and geographical control variables, and other control variables. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 5 presents the result of the short- to medium-term impact of intra-African trade on inflation in Africa. The results show a positive and statistically significant impact of intra-African trade on

the inflation rate using models 1, 2, and 3, where we do not account for the role of human and macroeconomic development. However, the results show that intra-African trade has a negative and statistically significant effect on inflation in Africa using the fourth model where the role of human and macroeconomic effects is accounted for, which is consistent with our hypothesis.

Table 5. Short- to medium-term impact of intra-African trade on inflation in Africa

VARIABLES	(1) PN-IV1	(2) PN-IV2	(3) PN-IV3	(4) PN-IV4
Intra-African Trade	0.00634** (0.00248)	0.00685** (0.00270)	0.00489** (0.00246)	-0.00299*** (0.000820)
Distance	0.183 (0.278)	0.162 (0.281)	0.501* (0.293)	0.0254 (0.0996)
Population	-0.348* (0.185)	-0.104 (0.317)	0.156 (0.373)	1.006*** (0.139)
Capital Stock		-0.263 (0.307)	-0.195 (0.335)	-0.765*** (0.127)
Colony			1.400*** (0.513)	-0.916*** (0.176)
Landlocked			0.0567 (0.748)	0.845*** (0.286)
Real GDP per capita				0.637*** (0.129)
Exchange Rate				0.895*** (0.0221)
Financial Market Dev.				0.698*** (0.165)
Human Development				2.599*** (0.733)
Constant	5.432* (2.854)	5.920** (2.968)	-0.0372 (3.332)	-2.229* (1.264)
Observations	221	221	221	220
R-squared			0.016	0.897
Regional effect	Yes	Yes	Yes	Yes
Year effect	No	No	No	No

Source: Researcher's compilation.

Note: PN-IV1 is the baseline model estimated with a 2SLS instrumental variable estimator; PN-IV2 is the baseline model augmented with factor input, PN-IV3 is the baseline model augmented with factor input and historical and geographical control variables and PN-IV34 is the baseline model augmented with factor input, historical, and geographical control variables, and other control variables. Standard errors in parentheses;

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

Hence, intra-African can potentially reduce inflation in Africa in the short- to medium-term period. However, it will be interesting to add to the finding of this study that failure to account for the role of human and macroeconomic effects may bias the result, particularly when modeling the inflation rate as a function of intra-African trade. Furthermore, the result shows that higher population, exchange rate depreciation, improved financial market performance, and higher income are among the factors that can amplify inflation pressure in Africa. The results suggest that an increase in population without a corresponding increase in production could create a supply gap, and as such, excess demand over supply, and by implication, increase in the general prices of goods and services. Similarly, given that African countries depend largely on other developed regions such as Europe for the importation of capital goods, it is expected that the depreciation of local currencies would amplify inflation in the region as the cost of production rises due to currency depreciation. This is the channel through which higher income pass-through to inflation is like those of population– excess demand–and exchange rate depreciation (imported inflation).

This result is consistent over the long-term period as the result from the cross-section model, presented in table 6, shows that the negative effect of intra-African trade remains in the long term. Meanwhile, the other three models, where the roles of human and macroeconomic development are excluded, could not detect this long-term significant impact, although they detected that the impact has turned negative. This further reiterates that accounting for the role of human and macroeconomic effects is important when modeling the inflation rate as a function of intra-African trade.

Considering another macroeconomic factor, financial market development, the result presented in table 8 shows the effect of intra-African trade on financial market development. Specifically, the panel version of the model presented in table 8 shows that intra-African trade has a positive and statistically significant effect on financial market development. The performance of this model, like that of the inflation model, improved significantly after accounting for the roles of human and macroeconomic development factors, as the three models that do not account for the roles of human and macroeconomic development factors fail to detect the significance of the effect of intra-African trade on financial market development. The positive and statistically significant effect of intra-African trade on financial market development implies that higher intra-African trade causes higher financial market development in the short to medium term. By implication, the AfCFTA has the potential to cause improvement in financial market development in Africa. This model also suggests that accounting for the roles of human and macroeconomic development factors is highly important.

Table 6. Long-term impact of intra-Africa trade on inflation in Africa

(1)	(2)	(3)	(4)
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VARIABLES	CS-IV1	CS-IV2	CS-IV3	CS-IV4
Intra-African Trade	-0.000342 (0.000536)	-0.000764 (0.000694)	-0.000518 (0.000563)	-0.000714* (0.000380)
Distance	0.0276 (0.0362)	0.0347 (0.0403)	0.00451 (0.0372)	-0.0380 (0.0319)
Population	0.0625** (0.0294)	-0.0142 (0.0470)	-0.0695 (0.0497)	-0.109** (0.0555)
Capital Stock		0.0927* (0.0500)	0.114** (0.0470)	0.171*** (0.0525)
Colony			-0.133** (0.0656)	-0.0661 (0.0645)
Landlocked			0.115 (0.0967)	0.104 (0.103)
Real GDP per capita				0.0271 (0.106)
Exchange Rate				-0.0788*** (0.0306)
Financial Market Dev.				0.109 (0.0838)
Human Development				-0.193 (0.563)
Constant	3.824*** (0.388)	3.580*** (0.464)	4.115*** (0.443)	4.146*** (0.596)
Observations	32	32	32	32
R-squared	0.067		0.193	0.467
Regional effect	Yes	Yes	Yes	Yes
Year effect	No	No	No	No

Source: Researcher's computation.

Note: CS-IV1 is the baseline model estimated with the 2SLS instrumental variable estimator; CS-IV2 is the baseline model augmented with factor input, CS-IV3 is the baseline model augmented with factor input and historical and geographical control variables and CS-IV34 is the baseline model augmented with factor input, historical and geographical control variables, and other control variables. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Short- to medium-term impact of intra-Africa trade on financial market development in Africa

VARIABLES	(1) PN-IV1	(2) PN-IV2	(3) PN-IV3	(4) PN-IV4
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Intra-African Trade	0.000536 (0.000349)	0.000505 (0.000377)	0.000352 (0.000354)	0.000688** (0.000314)
Distance	0.134*** (0.0391)	0.135*** (0.0392)	0.168*** (0.0422)	0.101** (0.0400)
Population	-0.102*** (0.0260)	-0.117*** (0.0442)	-0.0725 (0.0537)	-0.0730 (0.0651)
Capital Stock		0.0160 (0.0429)	0.00307 (0.0483)	-0.0186 (0.0593)
Colony			0.143* (0.0738)	0.270*** (0.0747)
Landlocked			-0.0761 (0.108)	-0.239** (0.119)
Real GDP per capita				0.103* (0.0550)
Exchange Rate				-0.130*** (0.0291)
Inflation				0.138*** (0.0318)
Human Development				-0.518* (0.311)
Constant	3.162*** (0.401)	3.132*** (0.414)	2.574*** (0.480)	2.969*** (0.473)
Observations	221	221	221	220
R-squared	0.144	0.147	0.172	0.302
Regional effect	Yes	Yes	Yes	Yes
Year effect	No	No	No	No

Source: Researcher's computation.

Note: PN-IV1 is the baseline model estimated with a 2SLS instrumental variable estimator; PN-IV2 is the baseline model augmented with factor input, PN-IV3 is the baseline model augmented with factor input and historical and geographical control variables and PN-IV34 is the baseline model augmented with factor input, historical, and geographical control variables, and other control variables. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Meanwhile, evidence from table 8 reveals that this positive effect is not statistically significant in the long run. However, the fact that it reveals a positive relationship while other models (without the roles of human and macroeconomic factors) reveal a negative relationship suggests that it also lends support to the earlier conclusion that failure to account for the roles of human and macroeconomic factors when modeling the macroeconomic effect of intra-African trade may bias results.

Table 8. Long-term impact of intra-Africa trade on financial market development in Africa

VARIABLES	(1) CS-IV1	(2) CS-IV2	(3) CS-IV3	(4) CS-IV4
Intra-African Trade	-7.39e-05 (0.000644)	-3.06e-05 (0.000667)	-6.97e-05 (0.000649)	0.000380 (0.000413)
Distance	0.123* (0.0704)	0.119* (0.0703)	0.136* (0.0763)	0.121* (0.0638)
Population	-0.106** (0.0462)	-0.0693 (0.0821)	-0.00760 (0.102)	-0.0237 (0.123)
Capital Stock		-0.0376 (0.0768)	-0.0827 (0.0890)	-0.121 (0.122)
Colony			0.0830 (0.134)	0.320*** (0.123)
Landlocked			-0.189 (0.198)	-0.365* (0.205)
Real GDP per capita				-0.138 (0.211)
Exchange Rate				-0.0742 (0.0716)
Inflation				1.167** (0.536)
Human Development				0.00982 (1.139)
Constant	3.370*** (0.719)	3.433*** (0.735)	3.190*** (0.865)	-1.171 (2.672)
Observations	32	32	32	32
R-squared	0.347	0.353	0.372	0.600
Regional effect	Yes	Yes	Yes	Yes
Year effect	No	No	No	No

Source: Researcher's computation.

Note: CS-IV1 is the baseline model estimated with the 2SLS instrumental variable estimator; CS-IV2 is the baseline model augmented with factor input, CS-IV3 is the baseline model augmented with factor input and historical and geographical control variables and CS-IV34 is the baseline model augmented with factor input, historical and geographical control variables, and other control variables. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Lastly, we examine the effect of intra-African trade on human capital development. The short- to medium-term effects result estimated by the panel regression model is presented in table 9, while the long-term effect result estimated by the cross-sectional regression model is presented in table 10. From table 9, the result shows that intra-African trade has no significant effect on human

capital development in the short to medium term. However, from model 4, which accounts for the roles of human macroeconomic development indicators, there is evidence that higher real GDP per capita and exchange rate depreciation are among the factors that could cause human capital development to increase.

Table 9. Short- to medium term impact of intra-Africa trade on human capital development in Africa

VARIABLES	(1) PN-IV1	(2) PN-IV2	(3) PN-IV3	(4) PN-IV4
Intra-African Trade	0.000196 (0.000126)	4.02e-05 (0.000126)	0.000139 (0.000112)	0.000111 (7.14e-05)
Distance	0.0267* (0.0142)	0.0331** (0.0131)	0.0322** (0.0134)	-0.00222 (0.00908)
Population	-0.0176* (0.00945)	-0.0928*** (0.0148)	-0.0485*** (0.0171)	0.00819 (0.0146)
Capital Stock		0.0811*** (0.0143)	0.0342** (0.0153)	-0.0241* (0.0132)
Colony			0.00890 (0.0234)	0.0234 (0.0172)
Landlocked			-0.194*** (0.0342)	-0.214*** (0.0223)
Real GDP per capita				0.0963*** (0.0103)
Exchange Rate				-0.0228*** (0.00665)
Inflation				0.0318*** (0.00710)
Financial Market Dev.				-0.0317** (0.0156)
Constant	-0.697*** (0.146)	-0.848*** (0.138)	-0.769*** (0.152)	-0.374*** (0.110)
Observations	221	221	221	220
R-squared	0.040	0.188	0.288	0.705
Regional effect	Yes	Yes	Yes	Yes
Year effect	No	No	No	No

Source: Researcher's computation.

Note: PN-IV1 is the baseline model estimated with a 2SLS instrumental variable estimator; PN-IV2 is the baseline model augmented with factor input, PN-IV3 is the baseline model augmented with factor input and historical and geographical control variables and PN-IV34 is the baseline model augmented with factor input, historical, and

geographical control variables, and other control variables. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Evidence from table 10 reveals that this result remained in the long run, and the impact of intra-African trade on human capital development remained insignificant. Also, exchange rate depreciation does not drive higher human capital development in the long run, but capital stock and real GDP do. Thus, on the relationship between intra-African trade and human capital development, this study concludes that intra-African trade does not significantly affect human capital development in the short or long term.

Table 10. Long-term impact of intra-Africa trade on human capital development in Africa

VARIABLES	(1) CS-IV1	(2) CS-IV2	(3) CS-IV3	(4) CS-IV4
Intra-African Trade	0.000102 (0.000253)	2.52e-05 (0.000240)	2.79e-05 (0.000220)	2.82e-05 (6.37e-05)
Distance	0.0179 (0.0276)	0.0239 (0.0253)	0.0223 (0.0258)	-0.00316 (0.0105)
Population	-0.0195 (0.0181)	-0.0837*** (0.0295)	-0.0484 (0.0345)	0.00463 (0.0191)
Capital Stock		0.0664** (0.0276)	0.0323 (0.0301)	-0.00840 (0.0192)
Colony			0.00621 (0.0454)	-0.000876 (0.0211)
Landlocked			-0.146** (0.0669)	-0.0978*** (0.0285)
Real GDP per capita				0.159*** (0.0173)
Exchange Rate				-0.0148 (0.0111)
Inflation				-0.0848 (0.0877)
Financial Market Dev.				0.00137 (0.0280)
Constant	-0.560** (0.282)	-0.671** (0.264)	-0.628** (0.292)	-0.120 (0.416)
Observations	32	32	32	32
R-squared	0.071	0.228	0.335	0.910
Regional effect	Yes	Yes	Yes	Yes
Year effect	No	No	No	No

Source: Researcher's computation.

Note: CS-IV1 is the baseline model estimated with 2SLS instrumental variable estimator; CS-IV2 is the baseline model augmented with factor input; CS-IV3 is the baseline model augmented with factor input and historical and geographical control variables, and CS-IV34 is the baseline model augmented with factor input, historical and geographical control variables, and other control variables. Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Findings improve on Gnimassoun (2020), who establishes a low significant impact of intra-African trade on per capita income. The empirical finding supports Romer's (1993) hypothesis as well as Mukhtar et al. (2019) on the negative link between inflation and trade openness. Findings also concur with those of Fagbemi et al. (2023) on the magnitude and direction of the effect of trade on financial development.

6.0 CONCLUSION, POLICY IMPLICATIONS, AND RECOMMENDATIONS

The AfCFTA was launched in May 2019, but its impact on the trading patterns and policies of African countries remains unclear. To determine how the AfCFTA can benefit Africa, a comprehensive study was conducted to examine the effect of intra-African trade on the macroeconomic performance of the continent. The study employed a two-step estimation technique to avoid any potential bias. In step one, the PPML was used to estimate the gravity model for intra-African trade, while in step two, the 2SLS instrumental variable (IV) estimator was used to estimate the macroeconomic models. Unlike previous studies, this study considers not only the commonly used factor, real GDP per capita, but also other macroeconomic indicators such as inflation, financial market development, and human capital development, which were ignored in earlier studies. The study covered the period from 1990 to 2022, which enabled it to capture recent occurrences. It also accounted for the roles of human and macroeconomic development in modeling intra-African trade as predictors of inflation and financial market development.

The gravity model results for intra-African trade, that is, panel and cross-sectional modeling, show that the income per capita of importing countries is more significant than the income per capita of exporting countries as determinants of intra-African trade in both the short- to medium-term and long-term periods. The same is true of the size of the populations of importing and exporting countries in the short- to medium-term period. Distance between importing and exporting countries reduces African trade in the short to medium term. Having the same colonial history and speaking the same language do not necessarily increase intra-African trade. However, affiliation with the same RTA has a strong, positive, and statistically significant impact on intra-African trade in the short- to medium and long-term periods in both importing and exporting countries. This suggests that intra-African trade will increase when all African countries belong to a common trade area, as enunciated by the AfCFTA.

The results show that intra-African trade has a positive significant impact on Africa's GDP per capita and financial market development in the short to medium term. Further, the study found that intra-African trade reduced inflation in Africa in the short to medium term but did not have a significant effect on human capital development in the short to long term. The findings emphasise the importance of considering the roles of human and macroeconomic development factors. In conclusion, the study fills a gap in the literature by providing a comprehensive analysis of the potential gains to Africa from the effective operationalization of the AfCFTA. The study's results provide valuable insights for policymakers and other stakeholders in the continent's economic development.

Accordingly, boosting intra-African trade on the continent requires efforts to increase per capita income. Increasing trade also requires improving the quality and scale of infrastructure to close distances on the continent. African governments should strive to strengthen and forge greater cooperation through RTAs to drive intra-African trade. Equally, given the potential benefits of the AfCFTA to Africa generally, it is recommended that the AU intensify its efforts toward ensuring compliance with the core rules of AfCFTA implementation by member countries. This can be achieved through greater collaboration between African nations, the promotion of greater competition, more investment in infrastructure, and the implementation of policies that encourage trade and investment.

With respect to the implications that can be drawn for effective operationalization of the AfCFTA, the following are plausible: First, a good and effective implementation of the AfCFTA protocols has the potential to increase per capita income in the short to medium term, which implies that it improves welfare. This can be achieved by facilitating the movement of goods, services, and people across African borders, thereby encouraging trade, and generating more job opportunities. Second, a functional AfCFTA implementation has the potential to reduce inflation permanently in Africa. By promoting competition and reducing trade barriers, the AfCFTA can encourage greater efficiency in African markets, leading to lower prices of goods and services. This can have a positive impact on the living standards of Africans, particularly the most vulnerable. Finally, a good and functional implementation of the AfCFTA protocols can potentially enhance Africa's financial market development. By promoting cross-border investment, AfCFTA can facilitate greater capital flows into Africa, leading to increased investment and employment opportunities and a more robust financial sector.

REFERENCES

- Alemayehu G., and H. Edris. 2015. "The Potential for Internal Trade and Regional Integration in Africa." *Journal of African Trade* 2 (1 and 2): 19–50.
- Aliyev, K., and I. Gasimov. 2014. *Openness-inflation Nexus in South Caucasus Economies*. MPRA Paper No. 62761, posted 10 Mar 2015.
- Arodoye, N. L., and M. A. Iyoha. 2014. "Foreign Trade-Economic Growth Nexus: Evidence from Nigeria." *CBN Journal of Applied Statistics* 5 (1): 121–141.
- Beine, Michel, and Christopher Parsons. 2015. "Climatic Factors as Determinants of International Migration." *Scandinavian Journal of Economics* 117 (2): 723–67. doi: 10.1111/sjoe.12098
- Bove, V. and L. Elia. 2017. "Migration, Diversity, and Economic Growth." *World Development* 89: 227–239. <http://dx.doi.org/10.1016/j.worlddev.2016.08.012>
- Burange, L. G., R. R. Ranadive, and N. N. Karnik. 2019. "Trade Openness and Economic Growth Nexus: A Case Study of BRICS." *Foreign Trade Review* 54 (1): 1–15.
- Coulibaly, D., B. Gnimassoun, and V. Mignon. 2018. "Growth-enhancing Effect of Openness to Trade and Migrations: What is the Effective Transmission Channel for Africa?" *Journal of African Economies* 27 (4): 369–404.
- Dufrenot, G., V. Mignon, and C. Tsangarides. 2010. "The Trade-Growth Nexus in the Developing Countries: A Quantile Regression Approach." *Review of World Economics* 146: 731–761.
- Ehrhart, Helene, Maelan Le Goff, Emmanuel Rocher, and Raju Jan Singh. 2014. *Does Migration Foster Exports: Evidence from Africa* (English). Policy Research Working Paper WPS 6739. Washington, D.C.: World Bank. <https://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-6739>
- Fagbemi, F., A. Fajingbesi, and G. E. Nzeribe. 2023. "Trade–Finance Nexus: The Centrality of the Quality of Institutions in Sub-Saharan African Leading Economies." *Foreign Trade Review* 00157325221137173.
- Fatima, S., B. Chen, M. Ramzan, and Q. Abbas. 2020. "The Nexus between Trade Openness and GDP Growth: Analyzing the Role of Human Capital Accumulation." *Sage Open* 10 (4): 2158244020967377.
- Fofack, H. 2020. *Making the AfCFTA Work for 'The Africa We Want.'* Brookings Africa Growth Initiative Working Paper. Washington, D.C.: Brookings Institution.
- Frankel, J. A., and D. Romer 1999. "Does Trade Cause Growth?" *American Economic Review* 89: 379–99.

- Gammadigbe, V. 2021. *Is Regional Trade Integration a Growth and Convergence Engine in Africa?* IMF Working Paper WP/21/19, 1–40. Washington, D.C.: International Monetary Fund
- Gandolfo, G. 1986. “The Neoclassical Theory of International Trade.” *International Economics* 33–75. Springer.
- Geda, A., and A. Yimer. 2023. “The Trade Effects of the African Continental Free Trade Area: An Empirical Analysis.” *World Economy* 46 (2): 328–345. <https://doi.org/10.1111/twec.13362>
- Gnimassoun, B. 2020. “Regional Integration: Do Intra-African Trade and Migration Improve Income in Africa?” *International Regional Science Review* 43 (6): 587–631.
- Haryani, P., Maulana, A., and Azam, S. F. 2022, February. “The Nexus of International Trade and Inflation on ASEAN-5 Countries’ Economic Growth: The Mediating Role of Exchange Rates.” *International Conference on Economics, Management and Accounting (ICEMAC 2021)* (pp. 238–248). Atlantis Press.
- IMF (International Monetary Fund). 2019a. *Regional Economic Outlook. Sub-Saharan Africa: Recovery amid Elevated Uncertainty*. IMF Publication Services. Washington, D.C.: International Monetary Fund.
- IMF. 2019b. *Sub-Saharan Africa Regional Economic Outlook: Recovery Amid Elevated Uncertainty*. World Economic and Financial Surveys. Washington, D.C.: International Monetary Fund.
- Lefeber, L. 2000. “Classical vs. Neoclassical Economic Thought in Historical Perspective: The Interpretation of Processes of Economic Growth and Development.” *History of Political Thought* 21 (3): 525–542.
- Lloyd, P. 2011. “The Discovery of the Heckscher–Ohlin Model of International Trade.” *International Journal of Development and Conflict* 1 (03): 241–263.
- Loli-Poma, T. P., F. I. Tayyiba Kausar, E. Ramirez-Asis, and E. J. Asnate-Salazar. 2021. “Nexus between Human Capital Accumulation and Economic Growth.” *Journal of Contemporary Issues in Business and Government* 27 (5): 2508–2521.
- Maneschi, A. 1992. “Ricardo's International Trade Theory: Beyond the Comparative Cost Example.” *Cambridge Journal of Economics* 16 (4): 421–437.
- Martinez-Zarzoso, I. 2013. “Gravity Model: An Application to Trade Between Regional Blocs.” *Atlantic Economic Journal* 31 (2): 174–187.
- Mukhtar, T., Z. Jehan, and F. Bilquees. 2019. “Is Trade Openness Inflationary in Developing Economies?” *Pakistan Economic and Social Review* 57(1): 47–68.

- Nazari, A., F. Pourshahabi, M. Dashtban, and Z. Asadi. 2022. "Free Trade and Inflation Nexus in Eight Emerging Economies of East Asia." *International Journal of New Political Economy* 3 (2): 51–67.
- Omoke, P. C., and S. Opuala-Charles. 2021. "Trade Openness and Economic Growth Nexus: Exploring The Role of Institutional Quality in Nigeria." *Cogent Economics and Finance* 9 (1): 1868686.
- Onyekwena, C., and T. F. Oloko. 2016. *Regional Trade for Inclusive Development in West Africa*. West African Think Tank Network (WATTNet) Inaugural Conference, La Palm Royal Beach Hotel, Accra, Ghana, March 1–2, 2016.
- Romer, D. 1993. "Openness and Inflation: Theory and Evidence." *The Quarterly Journal of Economics* 108 (4): 869–903.
- Sakanko, M. A., and D. Joseph. 2019. "Trade Openness and Inflation: Empirical Explanation of the Nexus in Nigeria." *International Journal of Social Sciences and Economic Review* 1 (2): 35–45.
- Salvatore, D. 1983. "A Simultaneous Equations Model of Trade and Development with Dynamic Policy Simulations." *Kyklos* 36 (1): 66–90.
- Saygili Mesut, Ralf Peters, and Christian Knebel. 2018. *African Continental Free Trade Area: Challenges and Opportunities of Tariff Reductions*. UNCTAD Research Paper No. 15. Division International Trade in Goods and Services and Commodities. Geneva: UNCTAD. https://unctad.org/en/PublicationsLibrary/ser-rp-2017d15_en.pdf
- Silva, J. M. C. S., and S. Tenreyro. 2006. "The Log of Gravity." *Review of Economics and Statistics* 88: 641–58.
- Songwe, V. 2019. *Intra-African Trade: A Path to Economic Diversification and Inclusion*. Report. www.brookings.edu/research/intra-african-trade-a-path-to-economic-diversification-and-inclusion
- Tripathi, J. S. 2023. "Trade-growth Nexus: A Study of G20 Countries Using Simultaneous Equations Model with Dynamic Policy Simulations." *Journal of Policy Modeling* 45 (4): 806–816.
- Tsegaye, D. L. 2015. *Trade and Growth Nexus in South Korea: Analysis Using Vector Error Correction Model and Granger Causality Test*. Global Development Network (88). New Delhi.
- Wirajing, M. A. K., T. N. Nchofoung, and F. M. Etape. 2023. "Revisiting the Human Capital–Economic Growth Nexus in Africa." *SN Business and Economics* 3 (7): 1–29.
- Wooldridge, J. M. 2010. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

World Bank 2020. *The African Continental Free Trade Area: Economic and Distributional Effects*. Washington, D.C.: World Bank. doi:10.1596/978-1-4648-1559-1.

Appendix 1

Definition and Measurement of Variables

Variable	Description	Source
<i>Trade</i>	Bilateral trade between African countries (intra-Africa).	Direction of Trade Statistics (DOTS) Website
<i>RYPC</i>	Real GDP per capita of the destination country in constant 2010 US\$.	CEPII database
<i>Kstock</i>	Capital stock at constant 2017 national prices (in mil. 2017US\$)	PWT version 10.1
<i>Pop</i>	Population	WDI (2023)
<i>CPI</i>	Consumer Price Index (2010 = 100)	WDI (2023)
<i>EXR</i>	Official exchange rate (LCU per US\$, period average)	WDI (2023)
<i>BRM</i>	Broad money (% of GDP)	WDI (2023)
<i>HCD</i>	Composite index measuring average achievement in three basic dimensions of human development	UNDP HDR21-22 Statistical Annex
<i>Landlocked</i>	Dummy variable = 1 if country i or country j is (are) land-lock and zero otherwise	CEPII database
<i>Colony</i>	Dummy variable = 1 if country i and country j have a common colonial history and zero; otherwise	CEPII database
<i>Language</i>	Dummy variable = 1 if country i and country j have the same official language and zero otherwise	CEPII database
<i>Colony</i>	Dummy variable = 1 if country i and country j have a common colonial master and zero otherwise	CEPII database
<i>Contiguity</i>	Dummy variable = 1 if country i and country j share a common border and zero otherwise	CEPII database
<i>Distance</i>	Physical distance in kilometers between the main city in country i and the main city in country j.	CEPII database
<i>ECOWAS membership when both reporter and partner are members</i>	Dummy variable = 1 if country i and country j are both members of ECOWAS and zero otherwise	CEPII database

<i>COMESA membership when both trading countries are members</i>	Dummy variable = 1 if country i and country j are both members of COMESA and zero otherwise	CEPII database
<i>EAC membership when both trading countries are members</i>	Dummy variable = 1 if country i and country j are both members of EAC and zero otherwise	CEPII database
<i>SADC membership when both trading countries are members</i>	Dummy variable = 1 if country i and country j are both members of SADC and zero otherwise	CEPII database