

# Trade Liberalization and Economic Growth amongst East African Community Countries: A Dynamic Panel Analytical Approach

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## Abstract

This study investigates the impact of trade liberalization on economic growth in East African Community (EAC) countries from 1990 to 2020. Using a Panel Autoregressive Distributed Lag (ARDL) model, the author finds that trade liberalization has a significant positive long-term effect on economic growth. However, the short-term impact is statistically insignificant.

## Keywords

Trade Liberalization, Economic Growth, East African Community, Panel ARDL

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## 1. Introduction

The role of trade in boosting a country's economic growth is widely recognized worldwide. The question of whether and how trade influences economic growth has long been a significant topic of debate among economists and policymakers. As a result, increased trade liberalization can accelerate the transfer of knowledge and innovation through continuous imports of high-technology goods from regions with greater innovation or through foreign direct investment (Kim, 2011). Therefore, by expanding the market size, trade liberalization enables countries to capture better the potential benefits of increasing returns to scale and take advantage of economies of specialization. Additionally, trade liberalization might motivate governments to implement minimal distortionary policies and to adopt more careful macroeconomic management in response to international competition pressures. However, the specific connection between trade liberalization and economic growth remains uncertain, as neither theoretical foundations nor empirical

evidence has led to a definitive conclusion.

Research has shown that the growth effects of trade liberalization are highly conditional rather than automatic. Several studies emphasize that trade liberalization can produce weak or even negative outcomes when key complementary conditions are missing. For example, countries with low institutional quality, including weak rule of law, corruption, or limited state capacity, often struggle to translate increased trade openness into productivity gains, as firms face high transaction costs and poor contract enforcement. Similarly, the effects tend to be muted in economies at early stages of development, where inadequate human capital, weak financial systems, or insufficient infrastructure constrain firms' ability to compete or adopt new technologies. Trade liberalization can also be destabilizing in settings with poorly diversified export structures, making countries more vulnerable to external shocks. Finally, when labor markets are rigid or social safety nets are underdeveloped, openness may lead to adjustment costs such as unemployment or sectoral displacement that offset potential efficiency gains.

Theoretically, there is limited doubt that long-term economic growth is positively affected by trade liberalization through technology transfers and innovation (Karras, 2003). Trade liberalization is an important aspect for academic and policy researchers for several reasons. First, it plays a key role in the structural adjustment programs launched by the World Bank and the International Monetary Fund in many developing countries. Second, numerous empirical studies highlight the significant role of trade liberalization in the economic growth of many developing countries, supported by the export-led growth and import-led growth hypotheses (Mishra et al., 2010; Hye & Boubaker, 2011; Shahbaz et al., 2011; Nasreen, 2011; Kim, 2011). Third, the historical economic rise of East Asian countries underscores the importance of trade liberalization policies. Lastly, the development of endogenous or new growth theories provides a theoretical foundation for empirically examining the relationship between trade liberalization and the economic growth of developing nations (Solow, 1956). Conversely, the neoclassical growth theory suggests no significant link between trade liberalization and a country's economic growth (Karras, 2003). This is because the neoclassical theory posits that economic growth is determined externally by technology, implying that interactions with other countries cannot drive long-term growth. In contrast, new growth theories argue that trade liberalization boosts economic growth by increasing spillover effects (Romer, 1990).

As noted by Levine and Renelt (1992), economic growth-related policies such as trade liberalization, macroeconomic stability, fiscal and monetary policy, and legal quality are highly interconnected, making it difficult to determine causal relationships (Kim, 2011). Countries that engage in more trade tend to have higher incomes. In contrast, wealthier countries are better equipped to afford infrastructure that promotes trade, possess more resources to offset information search costs associated with trade, or have a higher demand for traded goods. This can result in an unfavorable balance of payments, underscoring the need to examine

the relationship between trade liberalization and economic growth.

Several studies have focused on Sub-Saharan African (SSA) countries regarding the relationship between trade liberalization and economic growth using various econometric techniques that incorporate the role of institutions (Menyah et al., 2014; Brueckner & Lederman, 2015; Asamoah et al., 2019), while others concentrate on single-country studies examining the effect of trade liberalization on economic growth (Salahuddin & Gow, 2016; Keho, 2017; Malefane & Odhiambo, 2018; Udeagha & Ngepah, 2021). The key message from the literature is that there is unquestionably a positive relationship between trade liberalization and economic growth. However, existing literature still contains issues that require appropriate approaches to clarify the relationship between trade liberalization and economic growth. Conversely, the presence of such issues does not suggest that the observed relationship is weak. Fiestas (2005) rightly argued that, despite methodological concerns, there is no evidence that trade liberalization harms economic growth. The benefits associated with outward-oriented policies are clear and widely supported by both researchers and policymakers.

Despite the potential of trade liberalization to boost countries' economic growth, relatively little attention has been paid to its specific impact. Most research on this topic mainly focuses on exports, often neglecting the role of imports. However, some recent studies indicate that failing to control for imports can make the apparent causal link between exports and economic growth misleading or spurious (Esfahani, 1991; Riezman et al., 1996; Thangavelu & Rajaguru, 2004). Trade liberalization can be crucial for economic growth, since strong export growth is typically linked to rapid import growth. Furthermore, analyses that examine export growth without accounting for imports may suffer from the classic omitted-variable problem. Additionally, the East African regional economic bloc has been overlooked in the literature exploring the relationship between trade liberalization and economic growth.

The East African Community (EAC) has been passionate about regional trade integration among its members. In an attempt to reap the benefits of regional trade, the EAC established a customs union in 2005, with implementation over a five-year period (McIntyre, 2005; Shepherd, 2010a, 2010b). In 2009, the member states signed a new agreement to establish the EAC Common Market. The common market, which was implemented progressively, intended to ensure the free movement of goods, people, labor, services, and capital within the EAC, and protect the rights of establishment and residence. Plans were put in place in 2012 for a monetary union and further political integration among EAC members. Notwithstanding the important role trade liberalization plays in the overall EAC regional economic integration strategy, these countries are usually less integrated with international goods markets than expected. Indeed, trade liberalization plays a less important role in EAC economies than it does on average in comparable groups of SSA and low-income countries. This paper examines the effect of trade liberalization on the economic growth of the EAC countries using a dynamic panel estimation ap-

proach for the period 1990 to 2020.

Several studies have examined the effect of trade liberalization on the economic growth of countries in SSA, considering the role of institutions (Matthew & Adegbeye, 2014; Menyah et al., 2014; Brueckner & Lederman, 2015; Asamoah et al., 2019). Other research focuses on country-specific analyses (Polat et al., 2015; Salahuddin & Gow, 2016; Rafindadi & Ozturk, 2017; Keho, 2017; Malefane & Odhiambo, 2018; Udeagha & Ngepah, 2021). However, little attention has been given to studying the impact of trade liberalization on the economic growth of the East African Community as a bloc. This study adds to the growing body of literature on trade and economic growth by empirically analyzing the relationship between trade liberalization and the economic growth of East African Community countries, covering the period from 1990 to 2020.

## 2. Literature Review

### 2.1. Theoretical Review

From a theoretical perspective, trade liberalization drives economic growth through increased spillover effects (Romer, 1990). Developed countries innovate, while developing countries imitate technology (Grossman & Helpman, 1991). Additionally, Young (1991) argues that trade liberalization between developed and developing countries significantly promotes human capital formation in developing nations.

The relationship between trade liberalization and economic growth is often linked to the positive spillover effects from exposure to international markets. More clearly, trade liberalization can be seen as a driving force of economic growth in three main ways. First, it can directly boost economic growth by contributing to overall output. As a result, increased international demand for domestic goods can lead to higher overall output through more employment and income. Second, trade liberalization can influence economic growth indirectly through various channels such as more efficient resource allocation, higher capacity utilization, the benefits of economies of scale, and increased technological progress driven by international market competition (Helpman & Krugman, 1989). Trade liberalization enables firms to achieve economies of scale that are outside the scope of non-export sectors but are beneficial to the entire economy. Third, trade liberalization can attract foreign capital, leading to higher imports of intermediate goods, which in turn boost capital formation and promote output growth (Balassa, 1978; Esfahani, 1991).

The new growth theory has provided important insights into understanding the relationship between trade liberalization and economic growth. For instance, if economic growth is driven by Research and Development activities, then trade liberalization offers a country the opportunity to imitate its trading partners' technological knowledge. Additionally, trade liberalization enables producers to access larger markets and encourages the development of Research and Development through increasing returns to innovation (Yanikkaya, 2003; Ulasan, 2008). In particular, trade liberalization gives developing countries access to investment

and intermediate goods that are vital to their development. Finally, if the engine of economic growth is the introduction of new products, then trade liberalization plays a crucial role by providing access to new products and inputs.

The Harrod-Domar model, advanced by Harrod (1939) and extended by Domar (1946), assumes that capital accumulation drives economic growth. The model states that the economic growth rate is proportional to the rate of capital accumulation at a given level of technology. Additionally, Solow (1956) and Swan (1956) developed an exogenous growth model called the Neoclassical growth model by expanding the Harrod-Domar model to include labor as a factor of production. This model was criticized for its assumptions that ignore the long-term economic growth path. The endogenous growth theory, proposed by Romer (1994), argues that economic growth is determined within the system. Therefore, an economic growth rate can be achieved through changes in human capital.

Finally, the endogenous growth theory states that economic growth is mainly driven by internal factors rather than external influences. It explains that productivity improvements are directly linked to rapid technological innovations and increased investments in human capital from both the public and private sectors (Schultz, 1961; Uzawa, 1965). The theory argues that investment in human capital, innovation, and knowledge is a key driver of economic growth. It also suggests that a knowledge-based economy produces positive spillover effects, leading to high growth rates. Additionally, the theory assumes that economic growth depends on policy measures such as Research and Development and Education (Lucas Jr., 1988; Romer, 1990; Robelo, 1991; Mankiw, Romer, & Weil, 1992; Kremer, 1993). It highlights the Solow growth model, which claims that productivity results not only from physical capital and labor but also from technological progress. This progress is influenced by a country's openness to international trade (Solow, 1956). The model measures technological progress by assuming the production function exhibits constant returns to scale.

## 2.2. Empirical Review

Several studies have been conducted on the factors influencing economic growth, though their findings are mixed. This study specifically focuses on research that includes trade openness in analyzing economic growth. Abdulkadir and Idoko (2018) investigated the impact of international trade on Nigeria's economic growth from 1986 to 2017 using the OLS regression model. Their results showed that net exports, trade openness, and non-oil exports positively affect economic growth, whereas the exchange rate, oil exports, external reserves, and the balance of payments negatively affect economic growth. Additionally, the study found a long-term relationship between international trade variables and economic growth in Nigeria.

Additionally, Hye et al. (2016) used the endogenous economic growth model to analyze the long-term relationship between trade openness and economic growth in China from 1975 to 2009. The authors employed the Autoregressive Distributed

Lag approach to cointegration and rolling regression methods. They found that trade openness is positively related to economic growth in both the long run and short run. Similarly, [Adeleye et al. \(2015\)](#) investigated the effect of international trade on Nigeria's economic growth from 1985 to 2012, using net exports (total exports minus total imports) and the Balance of Payments as proxies for international trade, and Gross Domestic Product to measure economic growth. The authors used regression analysis with cointegration and error-correction modeling. They found that only Total Exports remain positive and significant. At the same time, the other variables are insignificant, indicating that Nigeria has a monocultural economy heavily reliant on oil, with little support from other sectors such as industry, manufacturing, or agriculture.

Additionally, [Hye and Lau \(2015\)](#) employed the new endogenous growth model for theoretical support, the Autoregressive Distributed Lag model, and the rolling-window regression method to examine the link between trade liberalization and economic growth in India from 1971 to 2009. The study also used the Granger causality test to determine the long-term and short-term causal directions. Their findings indicated that human and physical capital are positively related to long-run economic growth. At the same time, the trade openness index negatively impacts economic growth over the same period. Conversely, the new evidence from the rolling-window regression results indicates that the impact of the trade openness index on economic growth is not consistent across the sample period. Moreover, the results revealed that, in the short run, the trade openness index is positively related to economic growth, and the Granger causality test confirmed the validity of the trade openness-led growth and human capital-led growth hypotheses in both the short and long run.

In addition, [Zahonogo \(2016\)](#) studied how trade liberalization influences economic growth in developing countries using data from 42 SSA countries from 1980 to 2012. The researcher employed the Pooled Mean Group estimation technique, which is suitable for analyzing dynamic heterogeneous panels by accounting for long-term equilibrium relationships, and found that trade openness positively affects economic growth. Furthermore, [Tahir et al. \(2014\)](#) reviewed the existing empirical literature on the relationship between trade openness and economic growth, highlighting the persistent conflicting results, particularly on the empirical side. This has caused confusion among researchers and policymakers regarding the trade-growth connection. In a related study, [Gries and Redlin \(2012\)](#) investigated the short-term and long-term dynamic relationship between per capita GDP growth and openness across 158 countries from 1970 to 2009, using panel cointegration tests and panel Error-Correction Models (ECMs), combined with GMM estimation to examine the causal link between these variables. The authors addressed potential endogeneity between openness and growth by including only growth rates and lagged values of the independent variable, and by applying Difference GMM and System GMM estimation to mitigate the possible correlation between the lagged endogenous variable and the error term. Their analysis revealed

a long-term relationship between openness and economic growth, with a short-term adjustment to deviations from equilibrium. They also found that the long-run coefficients indicated positive, significant causality between openness and growth, and vice versa.

Malefane and Odhiambo (2021) investigated the dynamic effects of trade liberalization on economic growth in Lesotho using the Autoregressive Distributed Lag (ARDL) bound testing approach. They examined trade openness indicators, including three trade-based proxies and an index, covering 1979 to 2013. Their empirical results showed that trade openness does not have a significant effect on economic growth in the short or long term, regardless of the trade openness proxy used. Using the GMM estimation method between 2010 and 2014, Sakyi et al. (2017) examined the impact of trade and trade facilitation on economic growth in Africa, measuring trade facilitation using three indicators—trade, export, and import-related costs—derived from principal component analysis. Their findings suggest that trade facilitation is a key channel through which trade influences economic growth. Additionally, Ulaşan (2015) employed a first-differenced system GMM estimator to analyze the relationship between trade openness and economic growth within a dynamic panel data framework, using an augmented neoclassical growth model for the period 1996 to 2000. We test the robustness of our results by reducing the number of instruments. His analysis indicates that lower trade barriers are not associated with higher growth.

Also, Zhang et al. (2018) examined how trade liberalization influences economic growth in developing countries, focusing on SSA countries using a dynamic growth model with data from 42 SSA countries from 1980 to 2012. The authors used the Pooled Mean Group estimation technique, which is suitable for deriving conclusions from dynamic heterogeneous panels by considering long-term equilibrium relationships. They found that there is a trading threshold below which increased trade openness benefits economic growth, but above which the positive effect on growth diminishes. Similarly, Abdullahi et al. (2016) employed a random effects estimator to analyze the relationship between international trade and economic growth in West Africa from 1991 to 2011. Using panel data from 16 of the 17 countries in the region, they found that a 1% increase in exports is associated with a 5.11% rise in GDP. At the same time, imports have a positive but statistically insignificant impact on GDP growth.

Similarly, Yameogo and Omojolaibi (2021) analyzed the relationship between trade liberalization, economic growth, and poverty levels in 40 Sub-Saharan African countries from 1990 to 2017. The authors used the Panel Autoregressive Distributed Lag (ARDL) model, Panel Vector Autoregression (VAR), and the System of Generalized Method of Moments, finding that trade openness, foreign direct investment, and institutional quality significantly boost economic growth in the long term. In contrast, institutional quality decreases economic growth in the short term. Additionally, trade liberalization, institutional quality, and population growth rate contribute to poverty reduction in the long run, whereas trade open-

ness has negative effects in the short run. Using an instrumental variables approach, [Brueckner and Lederman \(2015\)](#) estimated the relationship between trade openness and economic growth in Sub-Saharan Africa from 1979 to 2009. Their results indicated that economic growth has a significant negative contemporaneous effect on trade openness, while trade openness positively influences economic growth. Furthermore, [Mogoe and Mongale \(2013\)](#) examined the impact of foreign trade on economic growth in South Africa using a cointegrated vector autoregression approach, which includes stationarity tests such as the Augmented Dickey-Fuller and Phillips-Perron tests, followed by the Johansen cointegration test and Vector Error Correction Model, covering the first quarter of 1990 to the second quarter of 2013. The findings revealed a long-term economic relationship among the variables: the inflation rate, export, and exchange rates are positively related to GDP, while imports are negatively related to GDP.

[Malefane and Odhiambo \(2018\)](#) examined the impact of trade openness on economic growth in South Africa using the Autoregressive Distributed Lag (ARDL) model from 1975 to 2014. The study employed four proxies for trade openness: the ratio of exports plus imports to gross GDP, the ratio of exports to GDP, the ratio of imports to GDP, and an index of trade openness that accounts for a country's size and geography. The results showed that trade openness has a positive and significant effect on economic growth when the ratio of total trade to GDP is used as a proxy. However, this was not the case with the other three proxies. In the short run, when the first three proxies are used, trade openness exhibits a positive impact on economic growth, but this effect is not observed when the trade openness index is employed. Additionally, using a two-step system GMM estimator, [Borojo and Jiang \(2016\)](#) analyzed the impact of Africa-China trade openness on Total Factor Productivity and economic growth for 38 African countries from 1995 to 2013. Their findings suggest that Africa-China trade openness has a robust positive effect on the GDP growth of African countries. Furthermore, when Africa-China trade openness interacts with institutional quality and human capital, its positive and significant effect on Total Factor Productivity becomes evident.

In conclusion, numerous studies have explored the drivers of economic growth, although their findings are mixed ([Gries & Redlin, 2012](#); [Ulaşan, 2015](#); [Hye et al., 2016](#); [Yameogo & Omojolaibi, 2021](#)). The existing literature offers inconsistent and inconclusive results regarding the impact of trade liberalization on economic growth, with particular focus on SSA countries and other regions ([Gries & Redlin, 2012](#); [Ulaşan, 2015](#); [Zahonogo, 2016](#); [Abdullahi et al., 2016](#); [Sakyi et al., 2017](#); [Zhang et al., 2018](#); [Yameogo & Omojolaibi, 2021](#)), as well as country-specific analyses ([Silva et al., 2013](#); [Adeleye et al., 2015](#); [Hye et al., 2016](#); [Abdulkadir & Idoko, 2018](#)). To the best of my knowledge, no study has specifically examined the effect of trade liberalization on economic growth in East African Community countries. This paper addresses this gap by analyzing how trade liberalization affects economic growth in the East African Community.

### 3. Methods and Data Sources

#### Theoretical Framework

To examine the effect of trade liberalization on economic growth, a model that includes the trade liberalization component is developed, modifying Feder (1982), Levin and Rault (1997), Zhang (2001), and Hoang et al. (2010). Specifically, the modification aims to analyze the relationship between trade liberalization and factors that promote economic growth. The modifications also incorporate endogenous growth theories based on empirical work by Romer (1990), Mankiw, Romer, and Weil (1992), Borensztein et al. (1998), Barro and Sala-i-Martin (1995), and Mutenyo et al. (2017).

This study uses the augmented Solow growth model, where output depends on capital stock, labor, and technology, following Mankiw et al. (1992). The model differs from the traditional Solow growth model by endogenously determining technology. As a result, this study adopts endogenous growth theory to connect the empirical model setup.

The augmented Solow growth model assumes that the savings rate, population growth, and technological progress are exogenous. Therefore, there are two inputs—capital and labor that are paid according to their marginal products. Assume the Cobb-Douglas production function of the following form, where production at time  $t$  is presented below:

$$Y(t) = K(t)^\alpha A(t)L(t)^{1-\alpha}, 0 < \alpha < 1 \quad (1)$$

In the standard Solow growth model, the long-run output per capita is determined by capital accumulation, labor force growth, and technological progress. The model also allows for policy and institutional factors to influence the steady-state level of income by affecting either: 1) the efficiency of capital and labor, or 2) the incentives to invest and accumulate capital. Although government expenditure and inflation do not appear explicitly in the basic Solow equations, they enter the empirical model through well-established extensions of the framework.

The standard representation is followed, where  $Y$  is output;  $K$  is capital stock;  $L$  is labor and  $A$  is the level of technology adopted by a particular industry.  $L$  and  $A$  are reported to grow exogenously at the rates  $n$  and  $g$  as expressed in the following function;

$$L(t) = L(0)e^{nt} \quad (2)$$

$$A(t) = A(0)e^{gt} \quad (3)$$

The number of effective labor units  $A(t)L(t)$  grows at the rate of  $n + g$ .

The model assumes that a constant fraction of output,  $s$  is invested. By denoting  $k$  as capital stock per effective unit of labor,  $k = \frac{K}{AL}$ , and  $y$  as the level of output per effective unit of labor,  $y = \frac{Y}{AL}$ , thus, the improvement of  $k$  is overseen by the following function:

$$\begin{aligned}\dot{k}(t) &= sy(t) - (n + g + \sigma)k(t) \\ \dot{k}(t) &= sk(t)^\alpha - (n + g + \sigma)k(t)\end{aligned}\quad (4)$$

where  $\sigma$  is the rate of depreciation of capital. Therefore, Equation (4) implies that  $k$  converges to a steady state value  $k^*$  as defined by the following function:

$$sk^{*\alpha} = (n + g + \sigma) \text{ or } k^* = \left[ \frac{s}{n + g + \sigma} \right]^{\frac{1}{1-\alpha}} \quad (5)$$

The steady state capital-labor ratio is positively related to the saving rate and negatively related to the population growth rate. Thus, the Solow growth model's predictions account for the effects of savings and population growth on real income. Hence, Equation (5) can be substituted into the production function, and by taking natural logarithms, the steady state income per capita is presented below:

$$\ln \left[ \frac{Y(t)}{L(t)} \right] = \ln A(0) + gt + \frac{\alpha}{1-\alpha} \ln(s) - \frac{\alpha}{1-\alpha} \ln(n + g + \sigma) \quad (6)$$

Since the Solow growth model assumes that factors are paid their marginal products, its predictions are not only about the signs but also about the magnitudes of the coefficients on saving and population growth. Specifically, because the share of capital in income ( $\alpha$ ) is nearly one-third, the model indicates an elasticity of income per capita with respect to the saving rate of nearly 0.5, and an elasticity of income per capita with respect to  $n + g + \sigma$  of approximately  $-0.5$ .

Now we include trade liberalization in the growth model. Thus, the empirical model is linked to the theoretical model through the endogenous growth theory. Specifically, the empirical model for this study is presented in Equation (7).

$$Y_{it} = \alpha_0 + \alpha_1 TL_{it} + \alpha_2 X_{it} + \varepsilon_{it} \quad (7)$$

where  $Y$  is economic growth,  $TL$  is trade liberalization measured by the openness index,  $X$  is a set of control variables specified by the growth theory. The subscripts  $i$  and  $t$  present country-specific and time-specific components, respectively.  $\alpha_0$  is an intercept while  $\alpha_1$  to  $\alpha_2$  are the coefficients of the explanatory variables and  $\varepsilon$  is the stochastic disturbance error term. Therefore, the general trade-economic growth relationship can be specified in the following equation:

$$RGDP_{it} = \alpha_0 + \alpha_1 TL_{it} + \alpha_2 GFC_{it} + \alpha_3 LBR_{it} + \alpha_4 INFL_{it} + \alpha_5 GE_{it} + \alpha_6 GDS_{it} + \varepsilon_{it} \quad (8)$$

where  $RGDP$  is real gross domestic product used as a measure of economic growth,  $TL$  is trade liberalization, proxied by the openness index, which is measured as the sum of imports and exports as a percentage of GDP.  $GCF$  is gross fixed capital formation as a percentage of GDP, used to measure physical capital.  $LBR$  is the labor force participation rate for the population aged 15 years and above.  $INFL$  is the inflation rate, measured by the annual GDP deflator.  $GE$  represents general government final consumption expenditure as a percentage of GDP, and  $GDS$  is gross domestic savings as a percentage of GDP.

It is important to note that this paper examines both the short-term and long-term relationships between economic growth and trade liberalization, as well as other control factors. Therefore, the simple regression equation used to estimate these relationships, while controlling for individual effects, is expressed as follows:

Following Pesaran et al. (1999), a dynamic heterogeneous panel data approach, and then specifying a panel ARDL( $p, q$ ), where  $p$  denotes the number of lags of the dependent variable and  $q$  defines the number of lags of the explanatory variables. The usual panel ARDL model can be presented in the following equation:

$$y_{it} = \eta_i + \sum_{j=1}^p \psi_{ij} y_{i,t-j} + \sum_{j=0}^q \mu_{ij} X_{it} + e_{it} \quad (9)$$

where the number of panels is  $i = 1, 2, \dots, 6$  and time is  $t = 1, 2, \dots, 6$  years,  $\eta_i$  is the fixed effects component,  $X_{it}$  is a  $(k \times 1)$  vector of regressors,  $\psi_{ij}$  is a scalar and  $\mu_{ij}$  is a  $(k \times 1)$  vector of coefficients (coefficients of the independent variables). Equation (9) can be reparametrized and transformed into the form of a linear combination of variables in levels and first differences to check for both the short-run and long-run coefficients as given below:

$$y_{it} = \eta_i + \phi_i' y_{i,t-1} + \varphi_i' X_{it} + \sum_{j=1}^{p-1} \psi_{ij}^* \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \mu_{ij}^* X_{i,t-j} + e_{it} \quad (10)$$

where  $\phi_i = -\left(1 - \sum_{j=1}^p \psi_{ij}\right)$ ,  $\varphi_i = \sum_{j=0}^p \psi_{ij}$ ,  $\psi_{ij} = -\sum_{m=j+1}^p \psi_{i,m}$  and  $\mu_{ij} = -\sum_{m=i+1}^q \mu_{i,m}$ , with  $j = 1, 2, \dots, p-1$  and  $i = 1, 2, \dots, q-1$ . If the variables are grouped in levels, then this can be represented as follows:

$$\Delta y_{it} = \eta_i + \phi_i [y_{i,t-1} - \theta_i X_{it}] + \sum_{j=1}^{p-1} \psi_{ij} \Delta y_{i,t-j} + \sum_{l=0}^{q-1} \mu_{ij} \Delta X_{i,t-l} + e_{it} \quad (11)$$

where  $\theta_i = -\phi_i^{-1} \varphi_i$  explains the long-run equilibrium relationship between the variables involved and  $\phi_i$  is the speed of adjustment with which economic growth corrects towards the long-run equilibrium, given the change in  $X_{it}$ . If  $\phi_i = 0$ ,  $\phi_i > 1$  or  $\phi_i > -1$ , then this implies that there is no convergence to the long-run relationship between economic growth and independent factors. However, given the existence of a long-run relationship, the coefficient is expected to be negative and statistically significant, indicating that the variables converge in the long run after a particular shock. Thus, Equation (11) can also be given as:

$$\Delta y_{it} = \eta_i + \phi_i y_{i,t-1} - \phi_i \theta_i' X_{it} + \sum_{j=1}^{p-1} \psi_{ij} \Delta y_{i,t-j} + \sum_{l=0}^{q-1} \mu_{ij}^* \Delta X_{i,t-l} + e_{it} \quad (12)$$

$$\Delta y_{it} = \eta_i + \beta y_{i,t-1} + \alpha X_{it} + \sum_{j=1}^{p-1} \psi_j \Delta y_{i,t-1} + \sum_{l=0}^{q-1} \mu_{ij}' \Delta X_{i,t-l} + e_{it} \quad (13)$$

where  $\beta = \phi_i$ ,  $\alpha = -\phi_i \theta_i'$  and the long-run coefficients  $\theta_i' = -\frac{\alpha}{\phi_i}$ . Thus, the typical panel ARDL model used in this study is expressed as follows:

$$RGDP_{it} = \sum_{j=1}^p \delta_j RGDP_{i,t-j} + \sum_{j=0}^q \lambda_{ij}' X_{it-j} + \varphi_i + \varepsilon_{it} \quad (14)$$

where  $RGDP_{it}$  is economic growth, which is the dependent variable;  $X_{it}$  is a  $k \times 1$  vector that is known to be purely cointegrated;  $\delta_j$  is the coefficient of the

lagged dependent variables known as scalars;  $\alpha'_{ij}$  and  $\lambda'_{ij}$  are  $k \times 1$  coefficient vectors;  $\varphi_i$  denote the unit-specific fixed effects;  $i = 1, \dots, N$ ;  $t = 1, 2, \dots, T$ ;  $p, q$  are optimal lag orders;  $X$  denote a set of control variables that are considered to have a significant effect on economic growth and  $\varepsilon_{it}$  is the ideal error term. The reparameterized panel ARDL  $(p, q, q, \dots, q)$  model is expressed in Equation (15).

$$\begin{aligned} \Delta RGDP_{it} = & \theta_i (RGDP_{i,t-1} - \gamma'_i X_{it}) + \sum_{j=1}^{p-1} \delta'_{ij} \Delta RGDP_{i,t-j} \\ & + \sum_{j=0}^{q-1} \lambda'_{ij} \Delta X_{i,t-j} + \varphi_i + \varepsilon_{it} \end{aligned} \quad (15)$$

where  $\theta_i = (1 - \sigma_i)$  represents the group-specific adjustment coefficient (expected that  $\theta_i < 0$ );  $\gamma_i$  is a vector of long-run relationships;  $ECT = (I_{it} - \gamma_i X_{it})$  is the error correction term;  $X$  represents a set of control variables; and  $\delta_{ij}, \alpha_{ij}$  are the short-run dynamic coefficient values.

$$\begin{aligned} \Delta RGDP_{it} = & \varphi_0 + \varphi_1 RGDP_{i,t-1} + \varphi_2 GCF_{i,t-1} + \varphi_3 LBR_{i,t-1} + \varphi_4 TL_{i,t-1} \\ & + \varphi_5 INFL_{i,t-1} + \varphi_6 GE_{i,t-1} + \varphi_7 GDS_{i,t-1} + \phi_1 \sum_{i=0}^{p-1} \Delta RGDP_{i,t-1} \\ & + \phi_2 \sum_{i=0}^{q-1} \Delta GCF_{i,t-1} + \phi_3 \sum_{i=0}^{q-1} \Delta LBR_{i,t-1} + \phi_4 \sum_{i=0}^{q-1} \Delta TL_{i,t-1} \\ & + \phi_5 \sum_{i=0}^{q-1} \Delta INFL_{i,t-1} + \phi_6 \sum_{i=0}^{q-1} \Delta GE_{i,t-1} + \phi_7 \sum_{i=0}^{q-1} \Delta GDS_{i,t-1} \\ & + \theta_i ECT_{i,t-1} + \varepsilon_{it} \end{aligned} \quad (16)$$

where  $p-1$  represents lags of the dependent variables;  $q-1$  represents lags of the regressors;  $i = 1, 2, 3, \dots, N$  is number of panels;  $t = 1, 2, 3, \dots, T$  is number of periods;  $ECT$  is error correction term and  $\theta_i$  is the coefficient of the speed of adjustment to the long-run equilibrium relationship and is supposed to be negative and statistically significant.

The Mean Group and Pooled Mean Group estimators, proposed by Pesaran and Shin (1995) and Pesaran et al. (1999), are used to estimate the impact of trade liberalization on economic growth in the East African Community. This is because the paper aims to identify both the short-run and long-run effects of trade openness on economic growth. The study employs MG and PMG estimators because these two assume all slope and intercept coefficients are equal across countries, unlike Dynamic Fixed Effects (DFEs) and Common Correlated Effects (CCEs) estimators, which assume all slope coefficients are equal but allow for different country-specific intercepts. It is noted that, for a cointegrating relationship to exist between variables, they should have the same order of integration (Phillips & Hansen, 1990; Johansen, 1995). Similarly, Pesaran et al. (1999) assume that Panel ARDL can be used with a mixture of both I(0) and I(1) variables.

The literature recommends the Schwarz Bayesian Information Criterion for selecting the optimal lag length because it performs better on small samples than other information criteria (Pesaran et al., 2001). In addition, Pesaran et al. (2001) propose the maximum lag length of 2 in cases of annual data analysis. As a result, data for all variables was obtained from the World Development Indicators of the World Bank.

#### 4. Analysis of Finding

This paper examines the effect of trade liberalization on economic growth among the East African Community countries. The analysis begins by examining the data's characteristics using descriptive statistics and correlation analysis to assess the potential for multicollinearity in the model. **Table 1** presents the descriptive statistics results for the data used in the model. These results show that the mean is a good measure of central tendency, as it falls between the minimum and maximum values for all variables. Additionally, the results indicate no evidence of outliers, as the standard deviation values are relatively small.

**Table 1.** Descriptive statistics results.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
RGDP	155	130.942	267.158	-50.248	894.52
GCF	155	16.692	9.383	-7.95	42.911
LBR	155	79.399	6.921	66.81	90.32
TL	155	40.198	12.006	19.684	72.858
GE	155	14.145	4.548	6.585	31.344
INFL	155	11.34	12.171	-5.231	85.353
GDS	155	26.956	43.06	-48.508	116.204

Source: Author's computation.

This paper continues by examining whether the regression model is affected by multicollinearity among the explanatory variables through a pairwise correlation analysis. This analysis also helps determine the degree of linear relationship between the model's variables. **Table 2** shows the results of the pairwise correlation analysis.

**Table 2.** Analysis of correlation results.

Variables	GCF	LBR	TL	GE	INFL	GDS
GCF	1.000					
LBR	0.386*	1.000				
TL	0.313*	-0.185*	1.000			
GE	-0.155	0.096	0.037	1.000		
INFL	-0.160*	0.035	0.054	-0.102	1.000	
GDS	-0.320*	-0.705*	-0.100	-0.451*	0.003	1.000

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Source: Author's computations.

The pairwise correlation results indicate no evidence of perfect multicollinearity among the variables because the correlation coefficient values for all the variables are below the 0.8 threshold in absolute terms (Studenmund, 2001). Therefore,

the regression model is unlikely to suffer from multicollinearity.

#### 4.1. Panel Unit Root Tests

This paper uses two panel unit root tests. These include Levin, Lin, and Chu (LLC), which assumes that the autoregressive parameters are similar across countries, meaning it maintains that the coefficients are homogeneous, and Im, Pesaran, and Shin (IPS), which hypothesize that the coefficients of the study variables are heterogeneous to test for panel data stationarity properties.

The two tests are often used in the literature to verify the stationarity of variables because of their different alternative hypotheses. The paper uses LLC and IPS panel unit root tests, which, unlike other panel unit root tests, account for heterogeneity in individual deterministic effects, such as a constant and a linear trend. They also allow coefficients to vary across groups under the alternative hypothesis, meaning not all cross-sectional units converge to the same equilibrium rate. **Table 3** presents the results of the panel unit root tests for both levels and first differences.

**Table 3.** Panel unit root test results.

Variables	LLC Test	IPS Test	LLC Test	IPS Test	Order of Integration
	Level		First Difference		
RGDP	-1.4721 (0.2205)	-2.7649*** (0.0028)	-11.2861*** (0.0000)		I(1)
TL	-4.0357 (0.1313)	-1.0457 (0.1478)	-9.2277*** (0.0000)	-6.8182*** (0.0000)	I(1)
GCF	-2.7080 (0.4908)	-0.7696 (0.2208)	-11.2473*** (0.0000)	-7.1236*** (0.0000)	I(1)
LBR	-2.1136 (0.2417)	2.8447 (0.9978)	-2.3279** (0.0456)	-4.0360*** (0.0000)	I(1)
GE	-4.3166** (0.0593)	-1.0452 (0.1480)		-6.5461*** (0.0000)	I(0)
INFL	-6.6426*** (0.0003)	-5.4162*** (0.0000)			I(0)
GDS	-3.1898** (0.0478)	-2.3747*** (0.0088)			I(0)

\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ ; Probability values in parenthesis. Source: Author's computations.

The LLC unit root test results show that only variables like general government final consumption expenditure, inflation rate, and gross domestic savings are stationary in levels because their  $p$ -values are less than 0.05, the significance level. All other variables are non-stationary in levels as their  $p$ -values are greater than 0.05. However, these variables become stationary after the first difference. Similarly, the IPS unit root test results indicate that only the real GDP growth rate, inflation

rate, and gross domestic savings are stationary in levels because their  $p$ -values are less than 0.05, the significance level. The remaining variables are non-stationary in levels but become stationary after the first difference. Therefore, we can confidently conclude that the unit root tests indicate that the variables meet the criteria for the Panel ARDL approach, which assumes the potential for a long-run relationship among variables with different orders of integration (Pesaran et al., 1999).

#### 4.2. Hausman Specification Test

The Hausman specification test was used to select the best model. The null hypothesis of slope homogeneity states that the PMG model is preferable; thus, it is not rejected and is accepted. This leads to the conclusion that the PMG model is better for explaining the drivers of economic growth. The regression results support this, as the Hausman  $h$ -statistic is 1.34 with a  $p$ -value of 0.9305. Because the  $p$ -value exceeds the 5% significance level, we do not reject the null hypothesis of slope homogeneity, confirming that the PMG model is the best choice for explaining the relationship between economic growth and the explanatory factors. Based on this, we cannot reject the null hypothesis of slope homogeneity and conclude that the PMG model is most suitable for explaining the relationship between economic growth and various regressors. Therefore, the results from the PMG model are discussed in the analysis.

#### 4.3. Pooled Mean Group Estimated Model Results

The Pooled Mean Group (PMG) estimator was selected over the Mean Group (MG) as the preferred estimator under the null hypothesis of the Hausman test. Since the study indicated a long-term relationship between economic growth and all the variables considered, the PMG is appropriate for estimating the strength of this relationship. The default results for the PMG include both long-term and short-term factor estimates. The PMG results are shown in **Table 4**.

The results of the error correction term for the effect of trade openness on economic growth indicate the speed of adjustment to the long-run equilibrium relationship following a particular shock. From the PMG results in **Table 4**, the lagged error correction term coefficient value is  $-0.469$ , which is negative as expected and statistically significant at 1% level. This indicates the presence of a long-run relationship between economic growth and the explanatory variables in East African Community countries. Specifically, it shows that about 46.9% of the deviations caused by the shock have been restored to equilibrium in the short run.

Trade liberalization had a positive, statistically significant impact on long-term economic growth, with significance at the 1% level. The positive coefficient of 0.127 indicates that a one-percent increase in trade liberalization raises economic growth in the East African Community by 12.7%, all else being equal. This positive effect may result from various initiatives adopted by East African leaders to advance the region's goals. These initiatives include trade, investment, finance, and

**Table 4.** Short-run and long-run coefficient results.

Variables	MG	PMG
Error Correction Term	-0.683*** (0.185)	-0.469*** (0.177)
Short-Run Coefficients		
D. Gross Fixed Capital Formation	0.262 (0.189)	0.128 (0.134)
D. Labor Force Participation Rate	3.276 (2.469)	4.878* (2.641)
D. Trade Liberalization	0.108 (0.191)	0.0129 (0.251)
D. Government Expenditure	0.531 (0.732)	0.153 (0.331)
D. Inflation Rate	-0.0332 (0.0575)	-0.0302 (0.0433)
D. Gross Domestic Saving	0.0332 (0.164)	0.119 (0.0741)
Long-Run Coefficients		
L. Gross Fixed Capital Formation	-7.794 (7.411)	-0.399*** (0.0748)
L. Labor Force Participation Rate	177.5 (178.0)	-0.225 (0.164)
L. Trade Liberalization	-11.77 (11.84)	0.127*** (0.0264)
L. Government Expenditure	-14.41 (14.14)	0.127 (0.110)
L. Inflation Rate	-1.012 (1.011)	-0.00884 (0.0261)
L. Gross Domestic Saving	1.379 (1.265)	0.347*** (0.0543)
Constant	345.3 (303.4)	13.57 (4.055)
Hausman h-statistic (p-value)		1.34 (0.9305)
Observations	150	150

Standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Source: Author's computations.

infrastructure development, aiming to improve market efficiency, reduce business costs, and enhance the region's integration into the global economy. Additionally, East African governments supported the Customs Union and common market that eliminated internal tariffs among member states and implemented a Common External Tariff (CET) for imports from outside the bloc. This reduced trade barriers within the region, lowered costs for importing intermediate goods and capital goods, and created a harmonized trading environment, all of which helped to spur investment, production efficiency, and intra-regional trade.

This has strengthened the benefits to member countries and, in turn, enhanced the economic performance of the East African Community nations. This finding aligns with economic theory, suggesting that trade among member states significantly contributes to economic growth (Solow, 1956; Romer, 1990). It also agrees with the findings of Adeleye et al. (2015), Hye et al. (2016), Keho (2017), and Gries and Redlin (2012), among others, who observed that trade openness positively and significantly impacts long-term economic growth in their studies. However, trade openness in the short run showed a positive but statistically insignificant effect on economic growth among East African Community member countries.

Gross fixed capital formation as a measure of physical capital has a negative and statistically significant effect on long-term economic growth, with significance at the 1% level. The negative coefficient of 0.399 indicates that a percentage increase in gross fixed capital formation decreases economic growth among East African Community member countries by 39.9%, assuming other explanatory variables stay constant. This negative impact could result from the diversion of resources intended for productive investments, such as infrastructure projects that typically boost a country's economic performance. Instead, these countries often allocate capital to less productive sectors, such as purchasing military equipment, which does not substantially contribute to economic growth and may even hinder it. This finding contradicts economic theory, which states that increased capital formation generally promotes economic growth (Solow, 1956; Romer, 1990). Nonetheless, the result aligns with Topcu et al. (2020), who also identified a negative and significant effect of gross fixed capital formation on economic growth. However, gross fixed capital formation in the short run shows a positive but insignificant effect on economic growth among East African Community countries. Therefore, this is an anomalous result that calls for further investigation.

Relatedly, the labor force participation rate showed a negative but insignificant impact on economic growth in the long run. However, in the short run, the labor force participation rate had a positive, statistically significant effect on economic growth at the 10% level. The positive coefficient of 4.878 indicates that, all other variables held constant, a percentage increase in the labor force participation rate boosts economic growth in the East African community by 487.8%. The short-term positive effect of labor on economic growth could be due to the initiatives by East African Community countries to promote human capital development, such

as investments in education infrastructure, which enhance labor productivity across these nations. Furthermore, many EAC economies have substantial underused labor and productive capacity in that when more individuals enter the labor market, particularly youth and women contribute to higher output, increased household incomes, and stronger domestic demand. This combination of greater labor supply and improved utilization of existing capacity translates into a short-run increase in economic activity and GDP growth. This finding aligns with economic theory, which states that improvements in labor productivity drive economic growth (Solow, 1956; Romer, 1990).

Similarly, gross domestic saving is reported to have a positive and statistically significant effect on economic growth in the long run, which is significant at a 1% level. The positive coefficient value of 0.347 indicates that a 1% increase in gross domestic saving raises economic growth by 34.7%, holding other regressors constant. The positive impact of gross domestic savings on economic growth in the East African Community bloc could be because East African governments have recognized the importance of savings in driving an economic growth agenda, as higher savings provide the funds needed for investment, stimulating an expansion in production and employment, ultimately leading to economic growth and development. This finding aligns with economic theory, which suggests that an increase in savings rates promotes economic growth and development (Solow, 1956). It also concurs with the findings of Najarzadeh et al. (2014), Elias and Worku (2015), and Ribaj and Mexhuani (2021), among others, who observed that gross domestic saving significantly affects economic growth. However, in the short run, gross domestic savings showed a positive but insignificant effect on economic growth in East African Community countries.

## 5. Conclusion and Recommendations

### 5.1. Conclusion

The study empirically examined the effect of trade liberalization on economic growth among the East African Community countries from 1990 to 2020. To achieve this primary goal, the panel ARDL model recommended by Pesaran et al. (1999) was used to identify the long-term and short-term relationships between economic growth and the regressors involved in the analysis. Before estimating the Panel ARDL model, the study conducted two panel unit root tests, including the Levin, Lin, and Chu (LLC) test and the Im, Pesaran, and Shin (IPS) test, to determine the stationarity properties of the panel variables and the order of integration of the study variables. The study found it appropriate to estimate the model using the Panel ARDL approach because the variables were integrated of order zero and order one.

Using the Hausman test, the Pooled Mean Group (PMG) estimator was selected, and the results confirmed a long-run relationship between economic growth and the independent variables in the East African Community bloc. The study's findings indicated that trade openness has a substantial long-term effect on economic

growth among East African Community member countries. Additionally, the results showed that gross fixed capital formation and gross domestic savings have significant long-term effects on economic growth within the region. The study's findings received strong support from economic theory and previous research, which also found that trade openness significantly influences economic growth.

## 5.2. Recommendations

The study found that trade liberalization has a strong, positive, and significant effect on economic growth in the EAC bloc. As a result, the governments of East African countries are urged to pursue aggressive diversification policies aimed at increasing trade benefits by implementing policies and incentives that will boost trade in the manufacturing and industrial sectors. This approach aims to ensure that exports of goods and services exceed imports, a proven way to achieve substantial economic growth and development in the region.

Also, gross fixed capital formation as a measure of physical capital has a negative and significant effect on economic growth in the East African Community in the long run. To mitigate the negative impact of gross fixed capital formation on economic growth, the governments of East African countries are encouraged to heavily invest in productive projects that promote long-term growth, such as infrastructure investments like roads or water systems, education, or research and development that creates new technology and advances the economic growth agenda of these countries. In the long run, these projects tend to attract domestic private investments and subsequently lead to employment creation and economic growth.

Additionally, gross domestic savings have been found to have a positive and significant long-term impact on economic growth in the EAC. To sustain these positive effects, the governments of East African countries are encouraged to create an enabling environment for investors to establish investment opportunities. This should ensure employment opportunities and poverty reduction, ultimately supporting economic growth and development.

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## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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