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Trade openness and economic growth in East African Community economies: A panel causality test

By Zakayo S. KISAVA [a†] & Godwin A. MYOVELLA [b]

Abstract. In spite of financial liberalization that has been discussed and studied over the past decades, the debate for the East African Community (EAC) still remain open on the relationship between trade openness and economic growth that has a link with trade-economic policies. This paper analyzes the relationship by employing the modern methodology of Dumistrescu & Hurlin (2012) Panel Causality test, The Test involved a scope of 46 years from 1970-2016. The empirical finding shows that there is a bidirectional movement (causality) as trade openness increase or relaxed lead to the growth of the economy in the East African Community. The results are supported by the endogenous growth theory that openness increases economic growth. There is a feedback relationship. The main operational implication of these empirical results is that the governments of the East African economies should dismantle barriers to trade to make sure that their intended objective is not ephemeral.
Keywords. East African Community, Economic growth, Panel causality test, Trade openness.
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1. Introduction

East African Community (EAC) is an economic grouping consisting of six countries namely, Tanzania, Kenya, Uganda, Rwanda, Burundi and South Sudan that joined the group in 2016. These countries despite having different development paths before and after their independencies, under the umbrella of the EAC have a common goal of transforming the lives of their citizens from poverty to better living standards. This objective is reached by lowering trade barriers, both tariff and non-tariff barriers. Also promoting trade both within the group and with the rest of the world. The common feature in the national trade policies of these countries has been to promote more open, competitive and export-oriented trade regimes that are compatible with their countries' national development objectives.

According to the World Bank, statistics show that these countries have had fast and sustained growth in Sub-Saharan Africa. For example between 2001and 2015, real GDP growth of Rwanda averaged at about 8% per annum, 5.8% in 2016 in Kenya, averaging 6–7% a year in Tanzania which has been said to be a sustained and relatively high economic growth over the last decade. Uganda has been indicated to have a slower growth rate of about 4.5% in the five years to 2015/16, compared to the 7% achieved during the 1990s and early 2000s. Whereas Burundi and South Sudan have been doing badly due to conflicts and political; unrest in

[a†] Graduate School of Social Science- DokuzEylul University, Turkey.
. +90 506 058 17 71
. zakayo.kisava@ogr.deu.edu.tr
[b] Department of Economics and Statistics, University of Dodoma, Tanzania.
. +90 506 058 17 71
. godwin.myovella@udom.ac.tz

those countries. So over time, there has been a remarkable economic growth in the region.

The question is, how the openness of these countries has helped the growth of their economies over time? This follows the long-term debate among economist, who has argued on the relationship between openness and economic performance. Despite the fact that traditional trade theories assert that as a country participate further in international trade and given that, the trade barriers are lowered there will be an impact in the export sector and hence in the dynamics of the economy (Sugata *et al.,* 2007). But these results seem not to be as obvious as cited in many kinds of literature.

On the one hand, the endogenous growth theories have underlined that trade openness is related to long-run economic growth through the internationally knowledge transmission (Grossman & Helpman, 1991). They Winters (2004), argues that there are two ways in which trade can lead into higher productivity, first is through an expansion for the market for output, which allows domestic producers to reap the benefits of economies of scale and economies of specialization. Secondly, an expansion through the inputs which drives growth in product variety and product quality models. The openness growth nexus was also supported by Romer (1990) who argued that the later could be reached by enlarging the base of productive knowledge through giving producers access to capital goods. That has also been supported by the study by Sachs & Warner (1995), and also the (World Bank, 2002; OECD, 1998; IMF, 1997), which found a positive association between trade openness and economic growth. There has been an argument also that; openness may lead to convergence in economies as the growth premium is higher in poor countries than in the rich countries (Rodriguez & Rodrick, 2001).

On the other hand, exogenous growth models including Solow (1956), and Ramsey they argue that technology is exogenous in the growth of output. Therefore, they further believe that technology is not impacted due to increasing more openness or trade liberalization and ultimately its contribution to economic growth can be rejected. The two prominent scholars Grossman and Helpman have at some point argued that even though the cornerstone of theoretical discussions have rested on the relationship between trade and growth, many empirical studies have based much on the examination between exports and growth. Basing on these arguments, this study intends to study the direction of causality between trade openness and economic growth using panel data in East African Economies. The reasons are to contribute first, by knowing the direction of causality we can be able to tell if the growth in these countries is from internal or external as argued in (Akilou, 2013). Secondly, this study intends to run the model that is simple and valid for a studying a group of countries rather than studying every individual country.

The rest of the paper is organized as follows; at the outset, we provide the relevant literature review both theoretical and empirical on the relationship between trade openness and growth. Next, we provide the brief description of the data, and estimation methods and finally we conclude the paper with some policy recommendations.

2. Literature review on trade openness and growth

The relationship between trade openness and economic growth has a long history dating more than two centuries back, during the time of the classical economists particularly Adam Smith and David Ricardo. Since the time of Smith who attacked the mercantilists' philosophy of protectionisms by advocating for free trade, there have been many schools of thoughts that have been in favor of the classical doctrine policies mostly stressing from the gains from trade. On the other hand, though, there have been some authors who have been skeptical of the idea and have come with some results that are opposing the idea of free trade and its benefit. Some have advocated for greater protection, and inward-looking

development (Todaro & Smith, 2006). According to Smith, the welfare and growth of a nation are contributed by an increase in specialization caused by openness, and division of labor coupled by international exchange.

In the Smith and Ricardian models, with openness, countries specialize in the production of goods for which they have comparative labor-productivity advantage, and they export such goods. They considered specialization as a source of efficiency gain and technological progress. Van den Berg & Lewer (2007) argue that when specialization is promoted new gains from exchange could be expected as countries exploit for the gains from specialization.

There has been a contribution from the new endogenous growth theories developed by Romer who has stressed the importance of trade openness and diversification (Romer, 1990). Romer (1992), Grossman & Helpman (1991) and, Barro & Sala-i-Martin (1995), among others, have been in favor of the proposition that, the more the countries liberalize their economies in relation to the rest of the world the more they are likely to draw in technological advances from the developed ones. In these models, some authors stress that there are different forces and mechanisms that lead to higher growth. That depends on if the gains from trade are from the reallocation of resources or efficiency gain.

Despite the benefits that may be realized from a trade, suffice it to say that there is skepticism that, the less developed countries are disadvantaged in the sense that they may not adopt the technologies from the developed countries due to technological and financial hurdles (Aghion, *et al.,* 2005). Besides that, other constraints include; lack of human capital, R&D, the presence of bureaucracy, and ineffective national institutions, The level of development of a country may have an implication on the impact of trade to the growth of a particular country (Haltiwanger, 2011; McMillan & Verduzco, 2011). According to Jones, (2000), as he commented in the paper by Rodriguez and Rodrick, he asserted that trade restrictions "infant industry" argument could sometimes promote long-run growth. Whereas other authors, such as Redding (1999), Young (1991), and Lucas (1988), maintain that, even with the increase in the level of trade openness economic growth may be impeded especially if the economies specialize in the less comparative advantaged sectors. It is this lack of clear effect of trade openness to economic growth that has puzzled economists for quite a long time and brings the need to empirically test the relationship between the two using the appropriate methodology and using correct proxies.

Empirical results just like the theoretical ones are mixed, different authors have found different results regarding the subject in question. There have been different explanations for the variations on the relationship between the two, including the level of liberalizations on the trade policy, the countries level of development, different proxies of the openness indicators, and methodologies used in the analysis among others.

Trejos & Barboza (2015), using static OLS and dynamic ECM they studied the relationship between trade openness and economic growth for twenty-three Asian countries. Their study revealed with robust empirical evidence that trade openness is not the main engine of the Asian economic growth miracle. The results of Trejos and Barboza were similar to those of Sarkar (2008), who did a panel study of around 50 countries, but when he analyzed the individual series of each country, the East Asian countries experienced no positive long-term relationship between openness and growth during 1961-2002. The authors (Trejos & Barboza, 2015), however, noted that at the regional level, there was a noticeable difference between the pre and post 1997–1998 financial crisis, while, in the post period, trade openness has a positive and significant effect on output growth.

Musila & Yiheyis, (2015) used the annual time series to study the relationship between trade openness on the level of investment and economic growth in Kenya. They found that aggregate trade openness is had a positive effect on the level of investment and the rate of economic growth, although the effect on the latter is statistically insignificant. On the other hand, they found trade-policy induced

openness to have negatively and significantly affected investment and the rate of economic growth. They also studied the causality using the Granger causality and they realized that the change in trade openness influences the long-term rate of economic growth through the interaction with physical capital growth.

Zeren & Ayse, (2013) studied the G7 countries and they applied the Granger non-causality test in heterogeneous panels to reinvestigate the causality relationship between trade openness and economic growth for these countries between 1970 and 2011. Their empirical results expressed the bidirectional causality relationship between the variables. Meaning that, as the economies deepen the level of openness the more they experience positive growth, and the more growth also leads to more openness trade. So from the review of the literature above, we note that there is the inconclusive link between the trade openness and economic growth. That is why this has been the topic of debate over time.

3. Data and econometric methodology analysis

3.1. Dataset and source

The data were sourced from UNCTADSTAT- United Nations Conference on Trade and Development that covers a period from 1970-2016 a total of 46 years for East African Community Countries, including the following; Kenya, Tanzania, Rwanda, Uganda, and Burundi. South Sudan joined the community late, as the result was not the best choice to avoid data biasness. The East African Community Countries we chose due to geographical location, trade interaction, and trade policies.

Economic growth is measured using Gross Domestic Product (GPD) per capita with constant 2010 price and Trade openness is measured as a ratio of trade Exports plus Imports (X+M) to the GDP.

3.2. Econometric Methodology

In this paper, we study the relationship between Economic Growth and Trade openness that we examine by panel causality test initiated by Dumitrescu & Hurlin (2012). This test is the latest version of the Granger (1969), which is famous for testing heterogeneous panel data models with fixed coefficients.

Generally, in testing non-panel data whether $\mathcal{X}_t$ granger causes $\mathcal{Y}_t$ lowers to factor implication on the lagged values of $\mathcal{X}_t$ in the regression.

$$\mathcal{Y}_t = c + \gamma_1 \mathcal{Y}_{t-2} + \cdots + \gamma_p \mathcal{Y}_{t-p} + \beta_1 \mathcal{X}_{t-1} + \beta_2 \mathcal{X}_{t-2} + \cdots + \beta_p \mathcal{X}_{t-p} + \mathcal{E}_t \qquad (1)$$

Whereby $\mathcal{E}_t$ fulfills the classical statements of being independent and identically distributed, the origins of the feature equation $1 - \gamma_1 r - \gamma_2 r^2 - \cdots - \gamma_p r^p = 0$ lie beyond the unit cycle, namely, $\mathcal{Y}_t$ is stationary while $\mathcal{X}_t$ is stationary itself, then $p \geq 1$. This can be explained as a null and alternative hypothesis;

$$H_0: \forall \kappa \geq 1, \ \beta_k = 0; \mathcal{X}_t \text{ does not Granger cause } \mathcal{Y}_t$$
$$H_A: \exists \kappa \geq 1, \ \beta_k \neq 0; \mathcal{X}_t \text{ does Granger cause } \mathcal{Y}_t$$

3.3. Panel Granger Causality Test

This is the extension of the Granger causality regression in equation (1) which associates cross-section $i = 1 \ldots N$ for each time observation $t = 1 \ldots T$. Based on this information the form would be assumed as;

$$\mathcal{Y}_{i,t} = C_i + \gamma_1, 1\mathcal{Y}_{i,t-1} + \gamma_i 2\mathcal{Y}_{i,t-2} + \cdots + \gamma_{i,p}\mathcal{Y}_{i,t-p} + \beta_{i,}1\mathcal{X}_{i,t-1} + \beta_i 2\mathcal{X}_{i,t-2} + \cdots + \beta_{i,p}\mathcal{X}_{i,t-p} + \mathcal{E}_{i,t} \qquad (2)$$

Where by the required roots of the characteristic equation $1 - \gamma_{i,1} r_i - \gamma_{i,2} r_i^2 - \cdots - \gamma_{i,p} r_i^p = 0$ to go beyond the unit cycle for all $i = 1, \ldots, N$,

The regression above can be put in the form of linear model as;

$$\mathcal{Y}_{i,t} = \alpha_i + \sum_{k=1}^{k} \gamma_i^{(k)} \mathcal{Y}_{i,t=k} + \sum_{k=1}^{k} \beta_i^{(k)} \mathcal{X}_{i,t=k} + \mathcal{E}_{i,t}, i = 1,2, \ldots, N: t = 1,2, \ldots, T \quad (3)$$

Where by x and y are the variables observed for N individuals in T periods. $\beta_i = (\beta_i^{(1)}, \ldots, \beta_i^k)$ and the individual affects α_i are assumed to be fixed in the dimension. We also put assumption that lag orders of K are identical for all cross section units of the panel.

Furthermore, we put assumption that $\epsilon_{i,t}$ are independently and normally distributed across both i and t; namely, $E(\epsilon_{i,t}) = 0, E(\epsilon_{i,t}^2) = \sigma_i^2$, and $E(\epsilon_{i,t}\epsilon_{j,s}) = 0$ for all $i \neq j$ and $s \neq t$.

At this point, let's differentiate the meaning of presence and absence of Granger causality in panel data set actually means. The absence of Granger causality is simply as compelling non-causality across all cross-sections simultaneously, that can be illustrated below:

$$H_0: \forall \kappa \geq 1, and\ \forall_i \beta_{i,k} = 0; \quad x_{i,t} \text{ does not Granger cause } \mathcal{Y}_{i,t}, \forall_i$$

In which on the other side we hypothesize the presence of Granger causality as causality that exists for some percentage of the cross-sectional structure;

$HA_1: \forall \kappa \geq 1\ and\ \forall_i = 1, \ldots, N_1, \beta_{i,k} = 0; x_{i,t}$ does not Granger cause $\mathcal{Y}_{i,t}, \forall_i \leq N_1 \quad \forall_i = N_1 + 1, \ldots, N, \exists \kappa \geq 1,\ \beta_{i,k} \neq 0;\ x_{i,t}$ Granger cause $\mathcal{Y}_{i,t}\ for\ i > N_1$.

Whereby $0 \leq N_1/N < 1$. Now the average statistic is proposed to be $W_{N,T}^{HNC}$, which is associated with null homogeneous non-causality (HNC) hypothesis as follows:

$$W_{N,T}^{HNC} = \frac{1}{N} \sum_{i=1}^{N} W_{i,T}$$

Whereby $W_{i,T}$ shows the specific Wald Statistics for i^{th} cross-section unit related to the individual test $H_0: \beta_i = 0$

Hence, the standardized test statistic $Z_{N,T}^{HNC}$ when $T \to \infty$ and followed by $N \to \infty$, which can be noted as $T, N \to \infty$;

$$Z_{N,T}^{HNC} = \sqrt{\frac{N}{2K}} (W_{N,T}^{HNC} - K) \to N(0,1)$$

Then, when $N \to \infty$ with T fixed. The final results can be summarized as follows;

$$\tilde{Z}_{N,T}^{HNC} = \sqrt{\frac{N}{2 \times K} \times \frac{(T - 2K - 5)}{(T - K - 3)}} \times \left[\frac{(T - 2K - 3)}{(T - 2K - 1)} W_{N,T}^{HNC} - K \right] \to N(0,1)$$

4. Empirical Findings

The empirical stage of the paper is to determine the causality relationship that exists between trade openness and economic growth according to Dumitrescu & Hurlin (2012). Economic growth is measured by GDP per capita while the trade openness is realized from the trade (sum of export and import) to the GDP ratio. Prior to the major theme of the paper, panel data variables have to be stationary. Hence, Panel unit root test is examined as suggested by recent literature that panel-based unit root tests have higher power than standard unit root tests based on individual time series. The following panel unit root tests ran: Levin, Lin, & Chu (2002), Fisher-type using ADF (Maddala & Wu, 1999; Choi, 2001) and PP tests; Hadri (2000). All variables are non-stationary at a level as the result we cannot reject the null hypothesis but stationary at first difference where the null hypothesis is rejected as seen in table 1 below.

Table 1. *Panel Unit Root Test*

	LLU	IPS	ADF-FC	PP-FC	Decision
Level					
TOP	0.9868	2.1157	1.7346	0.8375	
	(0.8381)	(0.9828)	(0.9980)	(0.9999)	Accept Ho
ECG	4.6954	5.3218	1.1364	0.7668	
	(1.0000)	(1.0000)	(0.9997)	(0.9999)	Accept Ho
First Difference					
TOP	-3.1091	-2.3576	21.4883	99.7151	
	(0.0009)	(0.0092)	(0.0179)	(0.0000)	Reject Ho
ECG	-1.9731	-2.0991	22.1968	70.4095	
	(0.0242)	(0.0179)	(0.0141)	(0.0000)	Reject Ho

Probabilities for Fisher tests are generated using an asymptotic Chi-square distribution while all other tests assume asymptotic normality.

Data revealed to contain cross-section independence; this is tested by the LM tests that developed by Breusch & Pagan (1980) and Pesaran (2004). The table 2, presents the results of cross-section dependence test for variables included in the study.

According to the results in Table 1, the cross-section independence hypothesis is rejected at 1% and 5% significance levels. In that case, the unit root test suggested by Pesaran (2007) can be used to study the stationarity of the variables. As is known, this is one of the tests used in the presence of cross-section dependence. Peseran's (2007) unit root test results and the CIPS statistics obtained are given in Table 2.

Table 2. *Results for Cross-section Dependence Test for Variables*

TESTS	*ECG*	*TOP*
CD LM1	215.5913	259.3624
	(0.0000)	(0.0000)
CD LM2	45.9716	55.75913
	(0.0000)	(0.0000)

Note: The values in the parenthesis indicate the p values

Dumitrescu-Hurlin Panel Causality Test results are presented based on the bootstrap critical values due to the presence of cross-section dependence in the model that describes and explains the causality relationship between trade openness and economic growth for East African Countries. The results are presented in Table 3, below. The DH panel causality test is constantly given for k=3 in table 3. Dumitrescu and Hurlin panel causality test result shows that the test statistic is statistically significant, it means that the bidirectional causality relationship exists on both variables though there is a strong relationship from economic growth to trade openness in comparison from trade openness to economic growth for East African Countries.

Table 3. *Dumitrescu-Hurlin Panel Causality Test*

TESTS	TOP→ECG	ECG → TOP
$W_{N,T}^{HNC}$	3.7414	5.3535
$Z_{N,T}^{HNC}$	1.6486	3.2730

5. Conclusion

East African countries have pursued regional and multilateral trade arrangements. They are signatories to multiple groupings such as, the East African Community EAC, the Common Market for Eastern and Southern Africa COMESA, World Trade Organization (WTO), etc. to exploit the trade potential which spur the ultimate goal of economic development and social transformation. Such economic partnership agreements aim at removing trade barriers, such as tariffs and nontariff barriers and embark on outward-oriented trade policies that lead to economic growth. So for a couple of years, they have been open and maintained liberal policies. The question posed by this study was, how the openness of these countries has helped the growth of their economies over time. This was achieved by studying the causality relationship between trade openness and economic growth of the five countries in the East African Community over the period of 1970 to 2016. For this purpose, we used the Granger non-causality test for heterogeneous panel data developed by Dumitrescu & Hurlin (2012).

The results of our empirical analysis reveal that there is a bidirectional causality relationship between both variables though there is a strong relationship between economic growth to trade openness. The findings conform to the endogenous growth theory that, that openness increases growth. However, there is a feedback relationship. The main operational implication of these empirical results is that the governments of the East African economies should dismantle barriers to trade to make sure that their intended objective is not ephemeral. As growth also causes openness, it turns out that, high economic performance is considered among the causes of high openness levels.

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