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REVIEW ARTICLE

THE FACTORS INFLUENCING COUNTRIES TO PARTICIPATE IN GLOBAL VALUE CHAINS EVIDENCE FROM EAST AFRICAN COMMUNITY (EAC)

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ABSTRACT

The world trade has perceived generous changes over the two past decades, because of not only downturn in transport costs but also the information technology upheaval, further open economic and trade policies. This paper analyses the factors influencing countries to participate in global value chain in EAC member states using gravity model. The paper uses data on the investment, gross domestic product, distance and landlocked in estimation. Due to its desirable properties especially in international trade, the Generalized Linear Model (IRLS - Fisher Scoring) is used to estimate the gravity equation before carrying out several others diagnostic tests to assess the robustness of results. The Empirical results shows that the flow of investment, which are a proxy of all trade policies, has a positive and significant impact on a country's level of openness. Gross Domestic Products that represent economic mass has no statistically significant impact on total trade flows. Distance and landlocked represent all barriers associated to the trade among countries have a negative and positive significant impact on bilateral trade flows respectively. Indeed, the EAC member should give more attention to create investment and value addition hub to move up the global value chain.

INTRODUCTION

The world trade has perceived generous changes over the two past decades, because of not only downturn in transport costs but also the information technology upheaval, further open economic and trade policies. According to National Board of Trade, the production is becoming more fragmented and at the same time more united, specialization through geographic division of production. One of the terms describing this modern trade reality is global value chains (GVCs).The GVC(s) is an emerging prospect in recent years forming not only an interconnection between countries but also raises their competitiveness in world trade (IMF, 2016; WTO, 2014). The international trade is increasingly shaped by the existence of value chains in East African Community (EAC)to prevent competition within the integrated area and hinders their participation in the global market where products are subject to a highly competitive environment, creating a trade value chain inside the community and overcome the challenges. The trade policy, structural and non-structural factors have been significantly increased the trade openness within backward and forwards integration to GVC within EAC. This paper intends not only to assess the factors influencing EAC members in GVC but also to contribute to the ongoing debate about the extent and desirability of integration into regional and global value chains and the manner in which such integration can be supported by a range of trade, trade-related and other policy instruments. The paper proceeds as follows. Section II gives an overview of the related literature and is followed, in Section III by a discussion of methodology and data used in this paper. Section IV presents the results of our empirical estimates and Section V concludes.

Discussion of related literature: Although Hirschman (1958) already discussed backward and forward linkages, the concept of value chains was introduced by Porter (1985) in the industry sector and described all the activities that should work together harmoniously to produce and sell a product while making it possible for actors at all levels to obtain the highest possible profits. However, the application of the concept has extended over the years to areas other than industry with the development of international trade since the early 1990s, characterized by the increasing integration of the world economy. As a result, value chains have become more internationally segmented (Faße, Grote, & Winter, 2009; Gereffi & Fernandez-Stark, 2011). Production processes previously dispersed become connected offering a golden opportunity for many countries to intensify their comparative advantages. The processing of one product is carried out by different enterprises in several countries. Trade in GVC which Asia and Latin America have greatly benefited from is

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introduced in the early to designate the fragmentation of production process and trade between countries. It also explains why the benefits of economic integration fail to reach developing countries and their poor. This type of trade enables participating countries to enjoy a share of the value added of goods and services produced while previously participants unable to produce the goods and services were kept away.

The extent of the participation of a country into the GVC is appreciated by dissociating the value added embodied in the products based on sources of origin and final destinations. Under this method, the literature (Lenzen, Moran, Kanemoto & Geschke, 2013) defines foreign value added (FVA) and domestic value added (DVA). The FVA known as backward integration is the share of the imported value added from foreign suppliers upstream that will be found in the country's exports. This represents the country's place in the value chain. The DVA is the sum of domestic value added of products directly consumed in the country where it is exported and the domestic value added of products that enter into the production of other countries' exports. The share of exported domestic value added which will be reflected in the exports of other countries is known as forward integration. In the latter case, the country provides inputs for another country production. Combining backward and forward integration gives a measure of a country's total GVC participation. In this context, World Economic Forum et al. (2015), Beck and Cull (2014), Taglioni and Winkler (2014), and AfDB et al. (2014), using descriptive statistics analyze the potential of GVC for Africa.

Rashmi (2013) measures the participation of different countries in GVC and estimates distribution of gains between countries in terms of countries' shares in total value added created by trade under GVC. Rashmi concludes that it is therefore important to gainfully link into GVCs in identified industries where the country is able to derive net positive domestic value-added gains. United Nation Economic Commission for Africa (2016) examines the potential of North Africa in the integration of regional value chains and shows that industrialization is essential to realize effective structural transformation, and the development of regional value chains can be an important lever to overcome the challenges that arise in the region. If empirical studies on regional integration are numerous and very advanced, the empirical literature on the integration of value chains is very rare and even limited. The link between regional integration and trade is basically studied with Gravity models. Alemayehu and Haile (2002), use gravity models to estimate the effect of regional integration on trade flows in Africa, Europe, or Latin America. It appears that regional integration has a positive effect on trade. Moral-Benito (2012) and International Monetary Fund (2015) discuss the relation between growth in GDP per capita in sub-Saharan African and trade openness. They find that increased trade openness and the improvement in terms of trade have accelerated per capita GDP growth in sub-Saharan Africa. However, this increased trade integration has also made the region more vulnerable to external shocks. International Monetary Fund (2015) analyzes the missing link in sub-Saharan Africa's trade integration. By estimating gravity models covering 167 countries, the paper assesses the influence of geographical, institutional, and policy-related factors on bilateral trade flows. The use of aggregate data (Baldwin & Taglioni, 2006), the use of distance to capture transaction costs, the use of binary variables, Rose biases such as aggregation bias, auto-selection bias, and endogeneity bias are among the various critics formulated and need to be taken into account. Also, Plummer, Cheong and Hamanaka (2010) emphasize the importance of binary variables that can be correlated with other factors such as regional production shares, the distribution of the technology or intra-community travel which could be the real drivers of the increased intra-regional trade. The scarcity of econometric and empirical studies on GVCs integration is linked to the lack of trade input–output database on countries. It is only recently that databases have been built by OECD, UNCTAD and WTO using the methodology (Lenzen et al.2013). However, the databases do not still include all countries because of missing information in some sectors. The few empirical studies are recent. International Monetary Fund (2015) examines the insertion in GVCs with an unbalanced panel for 185 countries by focusing mainly on the real GDP per capita effect on backward integration. The results show that for the entire sample real GDP per capita has a positive effect on backward integration but for the subsample of countries with GDP per capita at or below US$22,000 backward integration and income levels are negatively related. Kowalski, Ugarte, Ragoussis, and Lopez Gonzalez (2015) realize several estimations to analyze the effect of GVCs participation on domestic per capita value added and diversification of exports across a sample of 152 countries. According to recent studies (International Monetary Fund, 2015; Kowalski et al., 2015; OECD et al., 2014), structural factors and policy factors are identified as the key determinants of a country's participation in GVC. The structural factors such as the market size or the level of development, degree of industrialization, and trade costs are based on the gravity theory of trade. The domestic market size is expected to be a strong determinant of the volume of GVC trade through the economic mass of trading partners (Anderson & van Wincoop, 2003; Evenett& Keller, 2002).The backward integration should develop with industrialization due to technological development and the emergence of a competitive services sector The distance to manufacturing hubs measures the costs of selling in foreign markets and affects backward integration. Policy factors are based on institutional approach and indirectly are associated with foreign direct investment, intra-regional trade, suitability of preferential trade agreement and trade performance indicators that can affect the competitiveness of the entire value chain (Miroudot, Spinelli, &Rouzet, 2013).

MATERIALS AND METHODS

Theoretical Framework: To define the pattern of international trade it is astute to remember influence of theories that preceded the enlargement of gravity model. Classical theory of comparative advantages defined by David Ricardo (1817) was a landmark in examining how trade can be mutually beneficial for all trade partners due to the labour and difference in labour productivity. Introduction of Heckscher-Ohlin trade theory (1919) based on relative factor abundance and difference in relative factor prices has opened long-lasting academic debate about all causes and effects of trade. Refined version of Heckscher-Ohlin theory was made with FPE theorem (Samuelson, 1948, 1949), Heckscher-Ohlin-Vanek theorem and some empirical testing that were mostly rejecting idea of real existence of HO theory, notably Leontief for USA (1954) and Horvat (1968) for Yugoslav countries. Conclusions

that arise from Heckscher Ohlin theory of international trade will remain very important in the analysis of changes in output prices due to changes in transport costs.

Analogy of Gravity force equation: Recently, gravity model has been utilized intensively to explain bilateral trade flows between two countries which cannot be solved by other economic theories. In physics, according to Newton‟s universal law of gravitation, the gravitational attraction between two objects is proportional of their masses and inversely related to square of their distance. The gravity model is represented as follow:$F_{ij}=G\frac{M_iM_j}{D_{ij}^2}$

Timbergen is a Dutch economist who first applied gravity model to analyse foreign trade flows in 1962. In his model, while dependent variable is the trade flow between country A and B, GDP and geographical distance are independent variables. The final estimated results showed that as opposed to distance, the GDP variable has positive effect on the trade flow between two countries, which means countries with larger economic sizes and closer distance tend to trade with each other more. Krugman and Obstfeld (2005) also utilizes gravity model for trade activities and they provides a common model as follow:

this can be intuitively tailored into the economics to the following form $X_{ij}=G\frac{Y_iY_j}{T_{ij}^2}$ where X_{ij} is export(or trade)from country i to country j, C is constant,Y_i, Y_j are the economic mass of countries I and j respectively and T_{ij} is the trade policies between two countries.

Model Specification and Estimation Techniques: In general, in line with the various estimation techniques previously discussed, the volume of bilateral trade flow between countries i and j in year t can be represented in logarithmic forms. For the sake of comparison and completeness, we adopt the Bergstrand (1989) equation as our preferred theoretical model. First, it is widely accepted in the literature; second, it ensures the modelling of multilateral trade resistance which if omitted can bias the estimated gravity coefficients (Baldwin and Taglioni, 2006; Fenstra 2006). In its standard form, the gravity model explains bilateral trade flows as a function of the trading partners' market sizes and their bilateral policies to trade. Market size is commonly measured by GDP. A number of variables are standard in the empirical literature to capture trade barriers: (i) Transport costs are generally captured by distance, landlocked to reflect that transport costs increase with distance, they are higher for landlocked countries are lower for neighbouring countries. The first equation that we estimate is the following:

$$LnTrade_{ij} = \beta_0 + \beta_1 lnGDP_i + \beta_2 lnGDP_j + \beta_3 lnInvest_{ij} + \beta_4 Distance_{ij} + \beta_5 llandlocked_{ij} \varepsilon_t)$$

where *Ln* denotes the natural logarithms of the variables; *i* and *j* are exporter and importer subscripts respectively while *t* denotes time period $trade_{ij}$denotes country *i* trade from country *j*, *GDP* denotes Gross Domestic Product whose coefficients are expected to be positive, *GDP*. *GDP*, *Distance* is the geographical distance between countries *i* and *j*, *Landlocked* also represent dummy variables. It is equal to one if either country *i* or country *j* is a landlocked country, and zero otherwise, and *Invest* denote the proxy of all trade policy associated to the trade. Finally, $\varepsilon_{ijt}$is the two-way error component term of the model.

Data description: Data of trade and factors influencing trade flows among EAC member is in the form of panel data, obtained from International Monetary Fund (IMF)and geographical distance in kilometers among the countries through the 10 years duration from 2007 to 2017. The table shows that all measurements represent good characteristics where there are minimal variability and well-centered data. Link between response variable and explanatory variables is shown in Table2:using coefficients of linear correlation:

From Table 2: it is clear there is expected linear correlation between variables where by Trade, GDP and investment shared the positive signs while distance and landlocked which are proxies of all transports cost have negative sign.

RESULTS AND DISCUSSION

Table 3: presents the result of Housman test for random effects model, test result indicates the hypothesis “individual effects from the entities do exist” has not been rejected, which shows the high effectiveness of pooled model. Thus, we decide to select fixed effects model and focus the interpretation on estimation results obtained from this model. We do some diagnostic test to relax the assumptions of fixed effects model. The result shows that there are multicollinearity and heteroscedasticity. Multicollinearity can be explained by the high correlation of among variables.

However, this is a common statistical phenomenon of gravity model estimation. In the case of large enough sample size in our study, the impact of multicolinearity on estimated result can be controlled. For heteroscedasticity, we use Generalized Linear Model (IRLS - Fisher Scoring) regression for heteroskedastic panel to resolve this phenomenon. Table 4 presents estimation results using equation (1) after resolving defects. Looking at the p values of the coefficients of the regressors and expected signs are proven in regression output, all the coefficients are highly significant except the variable

Table 1. Presents the descriptive statistics of variables used in the study

	LNTRADE	LNGDP	LNINV	DISTANCE	LANDLOCKED
Mean	1.580705	2.452811	2.817546	6.600000	0.666667
Median	1.819727	2.779395	3.093992	5.645000	1.000000
Maximum	3.706719	4.375895	3.503754	14.57000	1.000000
Minimum	-1.917323	0.000000	0.000000	0.000000	0.000000
Std. Dev.	1.242070	1.278432	0.816513	4.999702	0.475017
Skewness	-0.581005	-0.426773	-2.516785	0.303910	-0.707107
Kurtosis	2.625996	1.947446	9.024591	1.790880	1.500000
Jarque-Bera	4.097903	5.050135	169.4895	5.036397	11.68750
Probability	0.128870	0.080053	0.000000	0.080605	0.002898
Sum	104.3265	161.8855	185.9581	435.6000	44.00000
Sum Sq. Dev.	100.2779	106.2353	43.33504	1624.806	14.66667
Observations	66	66	66	66	66

Source: Authors

Table 2. Correlation matrix

	LNTRADE	LNGDP	LNINFR	DISTANCE	LANDLOCKED
LNTRADE	1	0.118	0.394	-0.463	0.043
LNGDP	0.118	1	0.636	0.369	-0.724
LNINVEST	0.394	0.636	1	-0.143	-0.303
DISTANCE	-0.463	0.369	-0.143	1	-0.632
LANDLOCKED	0.043	-0.724	-0.303	-0.632	1

Source: Author's calculation

Correlated Random Effects - Hausman Test
Equation: EQ02
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	0.000000*	4	1.0000

Table 4. Regression Gravity Equation is presented

Dependent Variable: LNTRADE
Method: Generalized Linear Model (IRLS - Fisher Scoring)
Date: 08/07/18 Time: 10:29
Sample: 2007 2017
Included observations: 66
Family: Normal
Link: Identity
Dispersion fixed at 1
Coefficient covariance computed using the Huber-White method with expected Hessian
Estimation settings: tol= 0.00010
Initial Values: C(1)=0.00497, C(2)=0.27154, C(3)=-0.11959, C(4)=-0.55510, C(5)=1.64664
Convergence achieved after 2 iterations

Variable	Coefficient	Std. Error	z-Statistic	Prob.
LNGDP	0.006210	0.194642	0.031905	0.9745
LNINFR	0.339420	0.198249	1.712091	0.0869
DISTANCE	-0.149482	0.036642	-4.079518	0.0000
LANDLOCKED	-0.693880	0.382137	-1.815788	0.0694
C	2.058305	0.727487	2.829335	0.0047

Mean dependent var	1.580705	S.D. dependent var	1.242070
Sum squared resid	64.57117	Log likelihood	-92.93553
Akaike info criterion	2.967743	Schwarz criterion	3.133626
Hannan-Quinn criter.	3.033292	Deviance	64.57117
Deviance statistic	1.058544	Restr. deviance	100.2779
LR statistic	35.70674	Prob(LR statistic)	0.000000
Pearson SSR	64.57117	Pearson statistic	1.058544
Dispersion	1.000000		

Source: Eview7 output

Coefficient Confidence Intervals
Date: 07/31/18 Time: 10:13
Sample: 2007 2017
Included observations: 66

		90% CI		95% CI		99% CI	
Variable	Coefficient	Low	High	Low	High	Low	High
LNGDP	0.006210	-0.288552	0.300973	-0.346686	0.359106	-0.463028	0.475449
LNINFR	0.339420	0.010162	0.668679	-0.054775	0.733616	-0.184733	0.863574
DISTANCE	-0.149482	-0.207864	-0.091099	-0.219378	-0.079585	-0.242422	-0.056542
LANDLOCKED	-0.693880	-1.276799	-0.110960	-1.391764	0.004005	-1.621841	0.234082
C	2.058305	0.889753	3.226858	0.659289	3.457322	0.198063	3.918548

Source: Eview7 output

GDP, it can be said that a rise in economic mass does not affect trade between countries that participate in it. Variable distance conforms with gravity model expectations. The coefficient interpreted as EAC's trade decreases in respect to distance. Estimated result obtained from the model in this study has similarities with previous studies in the application of gravity model to evaluate bilateral trade. The data provides much evidence to conclude that the true slope of the regression line lies betweenlower and upper bands at α=5% level of significance.

Conclusions and Recommendation

This study set out to provide an empirical assessment of the factors influencing countries to participate in GVC in a particular focus on the East African Community region. It seeks to contribute to the ongoing debate about the extent and desirability of integration into regional and global value chains and the manner in which such integration can be supported by a range of trade, trade-related and other policy instruments. One key finding is that the investment and geographical distance between countries are the main determinants of GVC participation and their relationships with backward and forward engagement are diverse.

The Empirical results shows that the flow of investment, which are a proxy of all trade policies, has a positive and significant impact on a country's level of openness. Gross Domestic Products that represent economic mass has no statistically significant impact on total trade flows. Distance and landlocked represent all barriers associated to the trade among countries have a negative and positive significant impact on bilateral trade flows respectively. Indeed, the EAC member should give more attention to create investment and value addition hub to move up the global value chain. This study also has some limitations in the data when the most of the variables used are the proxies that may not fully representing the real pictures of the phenomena understudies. In the future, a study with large - scale data of space and time and trues variable should be conducted, and will certainly give a universal result and fewer errors. However, this paper provides an interesting result and help policy makers to obtain the clearer view of trade improvement's trend of EAC in the following periods.

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