Export-Led Growth Hypothesis: Evidence from Agricultural Exports in Tanzania

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Abstract

This study examines the nature and direction of causality in Tanzania between economic growth and agricultural exports along with some selected variables such as labour force and domestic investment. The analysis for this study was carried out using time series data for the period of 1980 to 2013. The data series were tested for stationarity using Phillips-perron test and the results revealed that they were all stationary and integrated of order one *I(1).* The Johansen test of cointegration revealed that there are cointegrating vectors in the system. The Granger causality test results revealed no any support of the export-led growth (ELG) hypothesis for Tanzania. However, the growth-led exports (GLE) hypothesis for Tanzania was supported by the results of this study, implying that the government of Tanzania needs to promote growth in order to generate exports.

Keywords: Agricultural exports, Economic growth, cointegration, causality and Tanzania.

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1.0 Introduction

Economic Growth is possibly the leading goal of policy makers worldwide (Hernandez, 2011). It is a conventional wisdom among policy makers and academics that exports are key factor in promoting economic growth in developing countries (Dreger, 2011). One concern is that many developing countries are heavily dependent on primary commodity exports to developed countries (UNCTAD, 2005).

In achieving the goal of economic growth, approaches of attaining this goal do vary across and within countries over time. Export promotion is among the approaches commonly used to achieve this goal due to its observed success in Asian economic tigers; South Korea, Taiwan, Hong Kong, and Singapore (Krueger 1985). By early 1980's export-led orientation and export promotion had already secured a wide consensus among researchers and policy makers to the extent that they had become "conventional wisdom" among most economists in the developing world (Balassa, 1985). This was the case even to the multilateral organizations such as the World Bank and International Monetary Fund (IMF), therefore many developing countries were forced to stimulate their export-led orientation even more because most of them had to rely on multilateral organizations to implement adjustment and stabilization programmes (Emilio, 2001).

However, there are streams of past literatures which show different conflicting and mixed results which raise a number of questions on export and economic growth relationships. These studies are categorized into cross sectional analysis which mainly used rank correlation analysis and linear regression models (see Keesing, 1967; Krueger, 1985, Giles and Williams, 2000) and time series studies (see Manzoor, 2009; Merza, 2007 Mishra 2009 and Castro-zuniga,2004). One stream of literature stipulates that export is the engine of growth (see Balasa, 1978; Feder, 1982; Perry Sadorsky 1996) therefore these empirical studies provides support for the export led growth paradigm. The other stream of literature indicates economic growth to be the engine of export growth (See Al-Yousif, 1999; Henriques and Sadorsky, 1996). The third stream indicates a bidirectional relationship between the two (See Shombe, 2005; Sinoha-Lopete, 2004).

Most of the studies debating on the export led growth hypothesis were done in developed countries; few have been done in LDC's including Africa such as that of Musonda, 2007. However, we found only one published study by Shombe (2005), investigating causal relationships among agriculture GDP, manufacturing GDP and exports in Tanzania by using time series data for the period between 1970 and 2005. He also supported the export led paradigm.

Agriculture is one of the leading sectors of Tanzania's economy, the economy is therefore agrarian (ESRF, 2009). It has contributed substantially to the real GDP and foreign exchange earnings and its linkages have been higher than those of other sectors (URT, 2000). Between the year 1987 and 2000, agricultural contribution to the GDP was between 48.2 percent and 50 percent, and foreign exchange earnings were 54 and 56 percent respectively (URT, 2000).
To maintain economic growth Tanzania like other countries uses export promotion as one of the approaches (Shombe, 2008). Export promotion has been implemented using various strategies in the country such as establishment of export processing zones so as to speed up industrialization for export market. Also on following the path of export led growth the government of Tanzania established the national export strategy which aimed at critically assessing the recent export performance and trends, and highlighting the obstacles to

increased exports competitiveness (URT, 2009). With regard to trade the national export strategy has drawn upon a number of recent initiatives including: Tanzania Trade and Integration Strategy, Integrated Framework process, Draft Private Sector Development Strategy, 1996 Export Development Strategy, and the "Quick Wins" Export Strategy.

While many studies have shed some light and brought the relationship of export and growth to the fore of academic discussion, the literature is still very much limited in Tanzanian context. Although agricultural exports are important sources of foreign exchange, there is no recent empirical evidence assessing the short and long term effects of agricultural exports expansion on economic growth.

Thus, this paper therefore attempts to investigate the existence of short-run and long-run relationships between agricultural exports and economic growth in Tanzania, also to examine the existence of causal relationship between agricultural exports and economic growth. The remainder of this study is organized as follows. While section 2 gives model specification, section 3 reports the empirical results. Section 4 concludes.

2.0 Model specification and Data

The theoretical model use neoclassical framework theory of international free trade. The model incorporates export into the cob-Douglas production function as follows:

$$Y = f(K, L, X) \quad (1)$$

Where Y is output, K is capital, L is Labour and X is agricultural export.

This study uses time series data of real gross domestic product (GDP) a proxy for economic growth, real agricultural export (EXP), gross fixed capital formation a proxy for domestic investment (DI) and labour force (LAB) from 1980 to 2013. Our data have been obtained from UNCTAD database and all data are transformed into the natural logarithmic form to address the problem heteroscedasticity. The methodology employed in this study is the granger causality within vector correction model. The entire estimation process involves three steps which are unit root test, cointegration test and error correction model estimation.

2.1 Unit Root Test

Most time series data have a unit root problem, that is, they are not stationary. Dealing with non stationary time series may lead to spurious results and analysis, therefore, to solve the problem of non stationarity, the Phillips-Perron (PP) unit root test is employed. This study adopts methodology from Zuniga (2004) and the PP test model is expressed as follows:

$$Y_t = \alpha + \rho Y_{t-1} + u_t \quad (2)$$

The requirement that the errors be white noise comes from the fact that the limiting distributions of the test statistics depend on the correlation of the residuals.

In particular, the shape of the distributions depends on the σ^2 / σ_e^2 ratio, where σ^2 is the variance of the innovations and σ_e^2 can be expressed as:

$$\sigma_e^2 = \lim_{T \to \infty} T^{-1} \sum_{j=1}^{T} E\left[\left(\sum_{j=1}^{t} u_i \right)_j^2 \right] \quad (3)$$

The later term is a measure of the temporal covariance of the residuals errors. The idea behind the Phillips-Perron test is to use an empirical estimate of σ^2 and σ_e^2 to adjust the statistic itself so that it more closely conforms to the standard Dickey-Fuller distribution.

2.2 Co-integration and model estimation

We are concerned with test for cointegration to analyse the relationship between variables and decide which model to be used. If variables are co-integrated, that is there is long run relationship between variables, then VEC model which has an error correction mechanism is used otherwise VAR model is appropriate. Johansen cointegration test is used to test the hypothesis whether there is r cointegrating vectors and trace test is used. Trace statistic is used to test the null hypothesis that there are at most r cointegrating vectors against the alternative hypothesis that there are at least r+1 cointegrating vectors and is defined as;

$$\lambda_{trace}(r) = -T \sum_{j=r+1}^{P} \ln(1 - \hat{\lambda}_j) \qquad (4)$$

where T Is the number of observations.

2.3 Granger Causality within Vector Error Correction Model (VECM)

The next step is to test for the direction of causality using Granger causality test within the vector error correction model. Narayan and Smyth (2008), and Odhiambo (2009) emphasizes that the error correction based causality test, as opposed to the conventional Granger causality method, allows for the inclusion of the lagged error correction term derived from the cointegrating equations. Including the lagged error-correction term allows the long-run information lost through differencing to be reintroduced in a statistically acceptable way. Therefore, we specify the vector error correction framework (VECM) to examine a Granger type of causality with an error correction mechanism is given as follows:

$$\begin{bmatrix} \Delta lGDP_t \\ \Delta lEXP_t \\ \Delta lDI_t \\ \Delta lLAB_t \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{bmatrix} + \sum_{i=1}^{k} \begin{bmatrix} \gamma_{1i} & \varphi_{1i} & \omega_{1i} & \vartheta_{1i} \\ \gamma_{2i} & \varphi_{2i} & \omega_{2i} & \vartheta_{2i} \\ \gamma_{3i} & \varphi_{3i} & \omega_{3i} & \vartheta_{3i} \\ \gamma_{41i} & \varphi_{4i} & \omega_{4i} & \vartheta_{4i} \end{bmatrix} \begin{bmatrix} \Delta lGDP_{t-i} \\ \Delta lEXP_{t-i} \\ \Delta lDI_{t-i} \\ \Delta lLAB_{t-i} \end{bmatrix} + \begin{bmatrix} \eta_1 ECT_{t-1} \\ \eta_2 ECT_{t-1} \\ \eta_3 ECT_{t-1} \\ \eta_4 ECT_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \\ e_{4t} \end{bmatrix} \qquad (5)$$

Where: GDP_t = Real Gross Domestic Product, EXP_t = Real Agricultural Exports, DI_t = Real Gross Domestic Investment, LAB_t = Labour Force, ECT_t = Error Correction Term, $a_1,...,a_4$ are constant terms in a VEC model, $\gamma's$, $\varphi's$, $\omega's$, $\vartheta's$ and $\eta's$ are the coefficient of, GDP_t EXP_t DI_t, LAB_t and ECT_t respectively, $e_{1t},...,e_{4t}$ are error terms that are assumed to be white noise. The null hypothesis can be drawn as EXP_t, DI_t and LAB_t "does not Granger-cause" GDP_t if $\varphi_{1i} = 0$, $\omega_{1i} = 0$, and $\vartheta_{1i} = 0$ respectively against the alternative that EXP_t, DI_t and LAB_t "does Granger-cause" GDP_t if $\varphi_{1i} \neq 0$, $\omega_{1i} \neq 0$, and $\vartheta_{1i} \neq 0$,

3.0 The empirical Results

3.1 Order of Integration and Unit root test

The nature of our data is time series as stated earlier and has trend properties. We use unit root test to asses if agricultural export (EXP), labour force (LAB), domestic investment (DI) and real GDP are stationary or not and their respective orders of integration *I(k)*. The Phillips-

Perron unit root test was used to test both the level series and the first differenced series of the data. The results reported in Table 1indicates that all the series GDP, EXP, DI, and LAB in their levels were not stationary as their test statistics are greater than their corresponding critical values. The null hypothesis of non-stationarity of the series in their levels could not be rejected at the 0.01 level of significance. However, the series GDP, EXP, DI, and LAB became stationary after they were differenced once. Their test statistics are less than their corresponding critical values at the 0.1 and 0.01 levels of significance. Therefore, the null hypothesis of non-stationarity of the series in their first difference was rejected in favour of the alternative hypothesis and conclude that the series GDP, EXP, DI, and LAB are stationary and integrated of order one *I(1).* In this regard further econometric analyses suggested for this study can now be carried out.

Table 1: Phillips-Perron (PP) Unit Root Rests

Variables	Levels		First Differences	
	Test Statistics	Critical Values	Test Statistics	Critical Values
lnGDP	2.570	-3.696	-2.980*	-2.622
lnEXP	-0.361	-3.696	-6.021***	-3.702
lnDI	0.235	-3.696	-3.497***	-3.702
lnLAB	-1.631	-3.696	-2.913*	-2.620

Source: Authors' computation, 2015

Note: *** and * denote significance at 1% and 10% respectively

3.2 Johansen Cointegration Test

The next step in our analysis was to conduct a test of cointegration which helps to analyze the existence or non-existence of long run relationships among the variables. Before we employed the Johansen cointegration test, it was important that we determine the optimal lag length because cointegration analysis is very sensitive to lag length selection. To determine the appropriate optimal lag for our model, the lag order selection criteria test was used. On the basis of this test Adjusted likelihood ratio (LR) criterion, Final prediction error (FPE) criterion, Akaike information criterion (AIC), and Hannan-Quin information criterion (HQIC) all selected lag length of 4, while Schwarz Bayesian information criterion (SBIC) selected lag length of 2. This study chose lag length of 4 because it was chosen by all the selection criteria except one. After the appropriate lag length had been chosen, Johansen cointegration test was then conducted. The null hypothesis of at most r cointegrating vectors in our system is tested against the alternative hypothesis of $r+1$ cointegrating vectors. The results for the Johansen cointegration test are reported in Table 2. From the results for this test, trace statistic reveal that the null hypothesis of at most three cointegrating vectors $(r\leq3)$ could not be rejected at the 0.05 level of significance. This is confirmed by the fact that trace statistic is 0.2044 which is less than its corresponding critical value of 3.76 at the 0.05 level of significance.

Table 2: The Johansen cointegration test results

Null hypothesis	Alternative hypothesis	Trace Statistic	Critical values
r=0	r=0	84.4133	47.21
r≤1	r=1	37.9413	29.68
r≤2	r=2	16.6013	15.41
r≤3	r=3	0.2044*	3.76

Source: Authors' computation, 2015
* denotes the number of cointegrating vectors selected by Trace statistics

3.3 Granger Causality Test Results

The Johansen cointegration test confirmed that there is a long run relationship between variables. The existence of long run relationship among the variables implies causality but does not show its direction. As we mentioned earlier the direction of causality can be observed by conducting a joint test of linear hypothesis to determine if variable at all its lags Granger-causes another variable after the VEC model has been estimated. We used the stationary time series in their first difference form for GDP, EXP, LAB and DI. Table 3 reports the results for the short run or weak Granger causality test conducted within the VEC mechanism for the specifications listed in the table.

Table 3: Short run (Weak) Granger Causality Test Results

Direction of Causality	The Null Hypotheses	Chi-Square	P-value	Decision (H_0)
EXP → GDP	$H_0 : \varphi_{1i} = 0$	1.19	0.7547	Accept
LAB→ GDP	$H_0 : \omega_{1i} = 0$	0.65	0.8849	Accept
DI→ GDP	$H_0 : \vartheta_{1i} = 0$	1.41	0.7035	Accept
GDP→EXP	$H_0 : \varphi_{2i} = 0$	9.76**	0.0207	Reject
LAB→ EXP	$H_0 : \omega_{2i} = 0$	3.87	0.2755	Accept
DI→ EXP	$H_0 : \vartheta_{2i} = 0$	10.20**	0.0169	Reject
GDP→ DI	$H_0 : \varphi_{3i} = 0$	24.46***	0.0000	Reject
EXP→ DI	$H_0 : \omega_{3i} = 0$	1.64	0.6514	Accept
LAB→ DI	$H_0 : \vartheta_{3i} = 0$	4.23	0.2379	Accept
GDP→ LAB	$H_0 : \varphi_{4i} = 0$	16.43***	0.0009	Reject
EXP→ LAB	$H_0 : \omega_{4i} = 0$	18.96***	0.0003	Reject
DI→ LAB	$H_0 : \vartheta_{4i} = 0$	6.95*	0.0736	Reject

Source: Authors' computation, 2015
Note: ***, ** and * denote rejection of the null hypothesis at 1%, 5% and 10% levels of significance respectively

The short run Granger causality test results in Table 3 reveal no any evidence of short run bidirectional causality between the variables under investigation. However, there are evidences of unidirectional short run causality running from GDP to EXP, from DI to EXP, from GDP to DI, from GDP to LAB, from EXP to LAB, and from DI to LAB. The results confirm that GDP Granger-causes EXP, DI, and LAB in the short run because their corresponding p-values are less than the 0.01 and 0.05 levels of significance. Yet again, the short run Granger causality results confirm that DI Granger-causes both EXP and LAB since their corresponding p-values are less that the 0.05 and 0.1 levels of significance respectively.

EXP Granger-causes LAB in the short run because the corresponding p-value is less than the 0.001 level of significance. The short run Granger causality results in Table 3 further reveal that there is no any evidence of short run unidirectional causality running from EXP to GDP, from LAB to GDP, from DI to GDP, from LAB to EXP, from EXP to DI, and from LAB to DI since their corresponding p-values are greater than the 0.01, 0.05, and 0.1 levels of significance.

The Long run Granger causality test was also conducted so that for each dependent variable if the Chi-square statistic is significant at the 0.01, 0.05, or 0.1levels of significance, then it would imply that the corresponding error correction term is significant. The significance of the error correction term indicates the evidence of long run Granger causality running from the lagged independent variables to the dependent variable. The results for this test are reported in Table 4.

Table 4: Long run Granger Causality Test Results

Direction of Causality	The Null Hypotheses	Chi-Square	P-value	Decision (H_0)
ECT_{t-1}→GDP	$H_0 : \eta_1 = 0$	0.29	0.5882	Accept
ECT_{t-1}→EXP	$H_0 : \eta_2 = 0$	11.75***	0.0006	Reject
ECT_{t-1}→LAB	$H_0 : \eta_3 = 0$	17.53***	0.0000	Reject
ECT_{t-1}→DI	$H_0 : \eta_4 = 0$	0.77	0.3796	Accept

Source: Computed by the Authors, 2015

Note: *** denote rejection of the null hypothesis at 1% level of significance.

The long run Granger causality test results in Table 4 reveal that there is long run causality running from the lagged independent variables GDP, DI, and LAB to the dependent variable EXP. This is confirmed by the significance of the error correction term (ECT) at the 0.001 level of significance. There is also evidence of long run causality running from the lagged independent variables GDP, EXP, and DI to LAB since the p-value for the error correction term is less than the 0.001 level of significance. However, the long run Granger causality test results did not reveal any evidence of long run causality running from the lagged independent variables EXP, DI, and LAB to GDP, and from GDP, EXP, and LAB to DI since their corresponding p-values are greater than the 0.001, 0.05, and 0.1 levels of significance.

The short run and long run Granger causality tests gave us another opportunity to conduct another causality test which is the strong Granger causality test. This test, as Acaravci and Ozturk (2012) opine, is conducted by testing the null hypothesis that both the coefficient estimates of a certain variable and that of the error correction term are equal to zero. If these coefficient estimates are zero, it implies that there is no strong causality between the variables tested. The results from our analysis for this test are revealed in Table 5 for all the specifications listed in it.

Table 5: Strong Granger Causality Test Results

Direction of Causality	The Null Hypotheses	Chi-Square	P-value	Decision (H_0)
EXP, ECT_{t-1}→GDP	$H_0: \beta_{2i} = \eta_1 = 0$	1.22	0.8751	Accept
LAB,ECT_{t-1}→GDP	$H_0: \beta_{3i} = \eta_1 = 0$	0.82	0.9358	Accept
DI, ECT_{t-1}→GDP	$H_0: \beta_{4i} = \eta_1 = 0$	2.37	0.6677	Accept
GDP, ECT_{t-1}→EXP	$H_0: \beta_{5i} = \eta_2 = 0$	18.15***	0.0012	Reject
LAB, ECT_{t-1}→EXP	$H_0: \gamma_{2i} = \eta_2 = 0$	25.08***	0.0000	Reject
DI, ECT_{t-1}→EXP	$H_0: \gamma_{3i} = \eta_2 = 0$	15.31***	0.0041	Reject
GDP, ECT_{t-1}→DI	$H_0: \gamma_{4i} = \eta_3 = 0$	30.62***	0.0000	Reject
EXP, ECT_{t-1}→DI	$H_0: \gamma_{5i} = \eta_3 = 0$	2.51	0.6432	Accept
LAB, ECT_{t-1}→DI	$H_0: \lambda_{2i} = \eta_3 = 0$	13.22**	0.0102	Reject
GDP,ECT_{t-1}→LAB	$H_0: \lambda_{3i} = \eta_4 = 0$	18.95***	0.0008	Reject
EXP, ECT_{t-1}→LAB	$H_0: \lambda_{4i} = \eta_4 = 0$	21.51***	0.0003	Reject
DI, ECT_{t-1}→LAB	$H_0: \lambda_{5i} = \eta_4 = 0$	21.23***	0.0003	Reject

Source: Authors' computation, 2015

Note: *** and * denote rejection of the null hypothesis at 1% and 5% levels of significance respectively

Table 5 reveals that there is strong bidirectional causality between EXP and LAB since the corresponding p-values are less than the 0.01 level of significance. There is also strong bidirectional causality between DI and LAB since the corresponding p-values are less than the 0.01 and 0.05 levels of significance. These evidences of bidirectional causality suggest that there is strong causality running from EXP to LAB and also reversing back again to EXP. Likewise, there is strong causality running from DI to LAB and back again to DI. The test results also reveal that there is strong unidirectional causality running from GDP to EXP since the corresponding p-value is less than the 0.01 level of significance, hence supporting the GDP growth-driven exports hypothesis for Tanzania.

There is strong unidirectional causality running from DI to EXP as the corresponding p-value is less than the 0.05 level of significance, hence supporting that agricultural exports growth of Tanzania is led by domestic investment. The domestic investment of Tanzania is driven by GDP growth as the results in Table 5 reveal strong unidirectional causality running from GDP to DI, which is confirmed by the joint significance of coefficient estimates for GDP and the corresponding error correction term at the 0.01 level of significance. There is also strong causality running from GDP to LAB confirmed by the joint significance of the coefficient estimates of GDP and that of the corresponding error correction term at the 0.01 level of significance. However, the test results did not find any evidence of strong causality running from EXP to GDP, from LAB to GDP, from DI to GDP, and from EXP to DI since their corresponding p-values are greater than the 0.01, 0.05, and 0.1 levels of significance. This implies that the coefficient estimates for the variables and that of the corresponding error correction term are jointly insignificant.

4.0 Conclusion

This study aimed at examining the causal relationship between agricultural exports and economic growth of Tanzania using Johansen test of cointegration and Granger causality within VECM. Agricultural exports were chosen mainly because they are significantly country's exports to international markets. Other variables were included in the model to strengthen the analysis by avoiding biased causalities and other inferences that may result when only bivariates are used. The study results revealed that the export-led growth hypothesis was not supported in Tanzania. The rejection of the export led growth hypothesis is not all that surprising, considering that the trade policy reviews began in 2000 and the policy came into effect in 2003. These reviews of the recent past could not show impact in the economy for this short period of time. The study findings contradict the empirical results of Shombe (2008) who supported the export-led growth hypothesis in Tanzania. The differences in the empirical results of these two studies may have been caused by the differences in the treatment of data. Shombe (2008) disaggregated the GDP into agricultural and manufacturing while this study used total GDP.

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