

Determinants of Tanzanian agricultural export: A case of cotton lint.

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Abstract

This paper examines the determinants of agricultural export (cotton lint) in Tanzania using secondary data from Food and Agricultural Organization data base (FAO STAT), Ivan Kushnir's Research Center and World Economic Indicators data base from 1970 to 2010. Cointegration and error correction model were employed to analyse the determinants of cotton lint export earnings in Tanzania. The findings reveal that cotton lint export earnings are mostly determined by internal factors like real exchange rate and agricultural productivity. The results also show that the estimated coefficients of real exchange rate and agricultural earnings are statistically significant meaning that real exchange rate and agricultural productivity have positive contributions on cotton lint export earnings in Tanzania. Non parametric test also reveal that trade liberalization strategy is a significant determinant of cotton lint export earnings in Tanzania. The computed chi-squared value is greater than critical table value at 5 percent level in one degree of freedom. So the study rejected the null hypothesis of samples having the same median and favored the alternative.

Keywords: Agricultural export, determinants of agricultural export, cotton lint, Tanzania.

1.0 Introduction

Determinants of agricultural export in developing countries after trade liberalization are still a controversial issue in economics. These determinants of agricultural export normally are divided into two main parts which are internal and external determinants. Some studies in developing countries found that internal determinants are significant in some countries whereas other studies found external determinants are significant in determining the agricultural export in the country under study. So the studies on the determinants of agricultural export in developing countries produce the mixed results.

Currently, there are two schools of thoughts which trying to explain the decline of many developing countries agricultural exports. The first school of thought asserted that, there are factors which are external to the individual country such as deteriorating of terms of trade, elasticity of demand of exported commodities and world income of trade partners. The mentioned factors are external determinants of agricultural export in developing countries Tanzania being among. Terms of trade and world income in some studies were found that are not effective enough in supporting developing countries export sectors (Santos-Paulino, 2003 and Penélope-López. 2005). On the other hand, second school of thought emphasizes that, the factors which are internal orientated are the one which deterred the agricultural export growth of the developing countries like Tanzania, such factors are poor domestic policies on trade, poor infrastructures, lack of agricultural export credit and taxation on agricultural exports (Gbetnkom and Sunday, 2002).

Based on those two schools of thought, recently there are hot debates on the determinants of agricultural exports in developing countries whether those determinants have improved the export sector of the liberalized countries or not (Kanan, 2000, Gbetnkom and Khan, 2002). In the matter of facts, this study is in line with the second school of thought, since Tanzania as among of developing countries has a control only over the internal factors and not otherwise. Ongoing debates fueled this study to be taken in Tanzania so as to examine the determinants of agricultural export since a country liberalized the trade in 1986. It is imperative to examine whether the economic reform undertaken in Tanzania has improved the agricultural export or not. In fact, over the three decade, Tanzania, like many other developing countries, has experienced a drastic fall in agricultural export growth in primary products as such causing a serious problem on balance of payments (Bigsten and Danielsson, 1999 and Kanan, 2000). For instance, in 2010 the value of cotton exports decreased even though the price of the

crop in that year increased. The value was decreased to USD 84.0 million in 2010 from 111.0 in 2009, almost decreased to 24.3 percent in that year. In that particular year the unit price of cotton in the world market was high by 11.2 percent whereas a cotton price in 2009 was USD 1,116.7 compared to USD 1,241.8 per ton in 2010 (URT, 2010). Therefore, this study, examined the internal determinants of agricultural export in Tanzania particularly on cotton lint.

2.0 Literature review

The reviewed literatures so far have found mixed findings about the determinants of agricultural exports in developing countries after trade liberalization. Some studies found that internal determinants are significant whereas some studies found external determinants are significant determinants of agricultural export in developing countries (Niemi, 2001 and Malik, 2007). For instance Majeed and Ahmad (2006) examined the determinants of export performance in Pakistan using panel observation for seventy five (75) countries from 1970 to 2004. Main variables studied were foreign direct investment, official development assistance as a percentage of gross domestic products, growth rate of gross domestic product. Other variables were national savings as a percentage of gross domestic product, Indirect taxes as a percentage of gross domestic product, total labor force and real exchange rate. This study examined the internal determinants on export performance in Pakistan. Empirical results reveal that, many variables were statistically significant determinants of exports performance in Pakistan except the foreign direct investment. Insignificant foreign direct investment in developing countries implies that every country has its own motive for foreign direct investment being industrial substitute or export promotion strategy. Generally, internal determinants dominated the export performance in Pakistan.

In the same vein Anwar et al. (2010) employed internal and external variables to determine the export performance of cotton lint in Pakistan. The main variables included were openness of agricultural trade, competitiveness and concentration of export and world demand. The empirical results showed that, internal and external determinants had positively influenced the export performance of cotton lint in Pakistan. For that matter, export performance of cotton lint in Pakistan is determined both by internal and external factors.

Internal determinants also found significant in Morocco and Tunisia (Mouna and Reza, 2001). In this study real exchange rate and export diversification as internal determinants were significant determinants of export growth in Morocco and Tunisia whereas real exchange rate was insignificant determinants of export growth in Algeria since a country tends to appreciate the domestic currency different with Morocco and Tunisia. It is of interest to note that, the devaluation/depreciation of currency seems to be a vital internal determinant of export growth in developing countries.

Notably, the internal determinants dominate the positive contribution on agricultural export performance in many developing countries Africa being among. Kusi (2002) examined the impact of trade liberalization on export performance from 1980 to 1990 using a cointegration technique. The study found different results on the determinants of export performance in South Africa as compared with other countries. Findings reveal that, external determinants dominated the export growth in South Africa rather than internal determinants. External market conditions found to be a significant determinant of export performance. These results went contrary to Anwar et al. (2010) and Mouna and Reza, (2001) in Pakistan, Morocco and Tunisia respectively. Again competitiveness found to be sensitive in mining and manufacturing sectors. Diversification of export being among of variables studied found responded to demand condition rather than supply factors. It is important to note that, these findings reflected more in manufacturing sector rather agricultural sector.

Yeboah (2008) and Mesike et al. (2008) examined the determinants of agricultural export in West Africa and came out with more less similar results that, internal determinants were significant factors on agricultural export. For instance, Yeboah (2008) examined the determinants of agricultural products in sixteen West African countries from 1989 to 2003. This study was carried under bilateral context with US and crop understudy was cocoa. Empirical results revealed that, resource endowment, relative size of economies of countries which was measured as a gross domestic product and sum of bilateral gross domestic product of United State of America (USA) and exporting countries, were the major determinants of agricultural export in West African countries. Yeboah's study also reveals that, trade liberalization in West African countries increased the world price of cocoa and export share tremendously.

Apart from resource endowment, gross domestic product and USA income being among of important determinants of agricultural export under Yeboah's study, Mesike et al. (2008) employed different variables like quantity of rubber output, exchange rate, annual rainfall, average producers price, average domestic consumption

and average world price to examine the effect of trade liberalization in Nigeria particularly on rubber industry. In their empirical study, results revealed that domestic variables are significant determinants of rubber export in Nigeria. However, domestic consumption, rainfall and world price were found not significant determinants of rubber export as compared with other variables. In this study internal determinants generally were found to be important in rubber export as compared with external factor.

Also a study by Babatunde (2009) examined the impact of trade liberalization on export performance in sub Saharan African countries from 1980 to 2005 and found a unique results that export performance in sub Saharan African countries is determined by import capacity of liberalized countries. This signifies that export performances in those countries are indirectly determined and not directly determined by other variables like production capacity, exchange rate and world price. Import capacity improved productivity of the country concern as such influenced the export performance in that manner. On top of that, the study also found competitive environment and real effective exchange rate were significant determinants of export performance in sub Saharan African countries. Study by Abolagba et al. (2010) analyzed the determinants of agricultural export in Nigeria particularly on cocoa and rubber and they finds that the internal factors like domestic rubber production, exchange rate, producer price, interest rate and domestic consumption were important determinants of rubber export in Nigeria whereas domestic consumption and rainfall were found to be statistically significant determinants of cocoa. With these results, agricultural exports in Nigeria are mostly determined by internal factors such it important for Nigerian government to take care of internal factors so as to earn more foreign currencies.

Concurrently Folawewo and Olakojo (2010) examined the determinants of agricultural export in oil exporting economy. The study was carried on in Nigeria using cointegration analysis from 1970 to 2007. They analyzed the agricultural output, world price and world income on agricultural export. Their findings reveal that internal and external determinants both were significant factors in agricultural export in oil exporting economy. Interesting the study found that agricultural output which is internal factor is more significant in determining agricultural export in oil exporting economy than external factors which were world price and world income. Allaro (2010) also examined the export performance of oilseeds and its determinants in Ethiopia from 1974 to 2009. In order to evaluate the determinants of oil seed in Ethiopia the study employed the similar variables as it used in other studies like Mesieke et al. (2008), Babatunde (2009), Abolagba et al. (2010) and Folawewo and Olakojo (2010) amongst others. The empirical results revealed that, nominal exchange rate and real output were the most significant determinants of export performance of oil seeds in Ethiopia under period of study. All these variables, nominal exchange rate and real output were internal determinants as such dominated export performance in oil seed in Ethiopia as compared to external factors.

According to the literatures reviewed so far on the determinants of agricultural export in developing countries, the findings show that, the internal determinants of agricultural export are leading against the external determinants. More empirical evidences were provided by Abolagba et al. (2010), Folawewo and Olakojo (2010) and Allaro (2010) where the internal determinants exceeded the external determinants on agricultural export in Nigeria and Ethiopia respectively. Also Hatab et al. (2010) they go similar results in Egypt. Hatab et al. (2010) employed gravity model to examine the determinants of Egyptian agricultural export over the period from 1994 to 2008. In order to ascertain their objective, they used the following variables, exchange rate, Egypt's gross domestic product, transport costs, gross domestic product per capita and population as explanatory variables against the explained variable which was agricultural export volumes. As it is mentioned earlier on, the internal determinants found to be significant determinants of Egyptian agricultural export. Empirical results revealed that Egypt's gross domestic product increases the agricultural export performance by 5.42 percent. Also the exchange rate found to be significant determinant of export performance in Egyptian agricultural produce under the period of study. In contrast, gross domestic product per capita and transport costs affected the agricultural export performance in Egypt negatively. So the results of Hatab et al. (2010) in Egypt were in line the Abolagba et al. (2010), Folawewo and Olakojo (2010) in Nigeria, that internal factors are more powerful determinants of agricultural export in developing countries.

Similarly Idoge et al. (2012) also investigated the agricultural sector in Nigeria. The study examined the determinants of export-led cassava production intensification among small-holder farmers in delta state in Nigeria. Their findings were not different from other researchers like Abolagba et al. (2010), Folawewo and Olakojo (2010) and Hatab et al. (2010). They found that cassava's production domestic prices, credit availability on cassava production, labour and extension contact were significant determinants of export led cassava production in delta state in Nigeria. All those variables are internal determinants of export led cassava production

in delta state as such the findings are in same vein with mentioned studies above. However it is important to stress that, there are some internal determinants like market system, labour costs and inadequate finance affected the export led cassava production negatively in delta state in Nigeria.

In same vein Amoro and Shen (2012) replicated the study in Cote d'Ivoire. They adopted the similar techniques used by Abolagba et al. (2010), Folawewo and Olakojo (2010) and Idoge et al. (2012). Amoro and Shen (2012) examined the determinants of agricultural exports in Cote d'Ivoire in cocoa and rubber similar to Abolagba et al. (2010) who examined cocoa and rubber in Nigeria. Their findings revealed that, rubber export in Cote d'Ivoire influenced by the domestic production, exchange rate, domestic consumption and interest rate tremendously. On other hand the study revealed that domestic consumption and rainfall influenced the export of cocoa significantly. It is of interest to note that world price found to be insignificant determinant of agricultural exports in Cote d'Ivoire in cocoa and rubber. Indeed, Amoro and Shen (2012) their results were in line with many other studies conducted in agricultural products in Nigeria. Therefore, the internal determinants of agricultural export performance seem to be more important factors in developing countries.

Also in East African countries there were studies which examined the determinants of export performance on agricultural and manufacturing firms like Were et al. (2002), Agasha (2009), McKay et al. (2010) and Rollo (2012). Agasha (2009) examined the determinants of export growth in Uganda. The findings revealed that export growth in Uganda were determined both by internal and external factors like gross domestic product, foreign direct investment, foreign price, real exchange rate and terms of trade. These findings provided different outlook as compared with many studied conducted in West and North African countries where internal determinants dominated the agricultural export performance. However, the study pointed out that the foreign direct investment was not statistically significant as compared with other variables. This result was in line with study by Majeed and Ahmad (2006) where they found that the foreign direct investment was statistically insignificant determinant of export performance in Pakistan. In different line McKay et al. (2010) examined the determinants of exports and investment of manufacturing firms in Tanzania and they found that trade liberalization influenced the export growth of manufacturing firms. However, this study did not examine the Tanzanian agricultural sector which is the main export sector in Tanzanian economy. Similarly Rollo (2012) took different outlook and examined determinants of Tanzanian export prices. The study evaluated the pricing behavior of Tanzanian exporters. The findings reveal that many firms decision behavior depends both in internal and external factors. However, no any attention was given to agricultural products on how the export performances are determined. It is of interests that, this study look at that angle. The objective of this study is to examine the determinants of agricultural export on cotton lint.

3.0 Methodology

The study employed the cointegration technique to examine the determinants of agricultural export a case of cotton lint in Tanzania similar to Allaro (2010). We find it better to employ cointegration technique since it is superior to other techniques like panel and gravity modeling. This technique is able to establish the short run and long run relationship amongst variables. Again this technique estimated the unit root and cointegration test. Granger (1986) cited in Gujarati, (2004) pointed out that testing for cointegration of the regression residual is imperative condition to avoid the possibility of producing spurious regression output. Therefore this study has taken into consideration the suggestion given by Granger, (1986).

This study signifies the determinants of agricultural export (cotton lint) as a function of real exchange rate and agricultural earnings as measure of agricultural productivity. The study adopted the analysis of imperfect substitute model as expressed by Goldstein and Khan (1985) cited in Allaro (2010) as follows

Export values of cotton lint

$$(X_{ct})=f(RER,AGE) \quad (1)$$

Where X_{ct} is export values of cotton lint, RER is real exchange rate and AGE is agricultural earnings as measure of productivity from 1970 to 2010. The study employed secondary data from different sources. Sources of data are from Food and Agricultural Organization data base (FAO STAT), Ivan Kushnir's Research Center and World Economic Indicators data base.

In the estimation process the equation (1) instituted the natural logarithms so as the variables to suit the time series behaviors properly. Equation (1) modified as follows:

$$\ln X_t = \alpha_0 + \alpha_1 \ln RER_t + \alpha_2 \ln AGE_t + u_t \quad (2)$$

The main variables included in this model are cotton lint export earnings (X_t) as dependent variable and

independent variables are real exchange rate and agricultural earnings. Real Exchange Rate (RER) is key determinant of agricultural export of any countries. It is expected that as we depreciate the domestic currency the agricultural export will increase and vice versa is true other factors remain constant. In this study real exchange rate determined multiplying the Tanzanian nominal exchange rate with the ratio of Tanzanian consumer price index (CPI) and USA consumer price index (CPI). This study uses real exchange rate as a measure of export competitiveness. The assumption behind is that as country depreciate her currency, other factor remains constant, more quantity output, that is cotton lint in particular will be exported.

Agricultural earnings are among of important determinants of agricultural export in developing countries like Tanzania. Agricultural export cannot be determined by real exchange rate, world price and other variables without improving agricultural productivity. The inclusion of agricultural earnings in this study is imperative so as to determine the contribution of agricultural production capacity in Tanzania to cotton lint earnings. U is random disturbance term with its normal classical assumptions and \ln is natural logarithm.

This study estimated the coefficients of long run relationship amongst the variables using equation (2) above after the regression residual found to be stationary. This is done using Augmented Dickey Fuller (ADF) test. Engle –Granger (1987) and Gujarati, (2004) pointed out that if the regression residuals of equation (2) above are stationary, then coefficients are not spurious and hence representing long run relationship amongst the variables. But if the regression residuals are non stationary then regression coefficients obtained in equation (2) will be spurious.

Also the study examined the time series variables of $\ln X_t$, $\ln RER_t$ and $\ln AGE_t$ if have unit roots, and thereafter the study taken the first difference of the variables (as in equation (3)) in order to obtain a stationary series:

$$\Delta \ln X_t = \alpha_0 + \alpha_1 \Delta \ln RER_t + \alpha_2 \Delta \ln AGE_t + u_t \quad (3)$$

Equation (3) above represents the short run information due to the fact that differencing equation (2) results into loss of valuable long run information in the data (Ahmed, 2000). In order to address this problem the theory of cointegration introduces an error correction term in the model. The use of error correction (EC_t) term helped to tie the short run behaviors of variables to its long run. The error correction model (ECM) initially was employed by Sargan and later on was popularized by Engle –Granger corrects for disequilibrium. Engle-Granger popularized ECM using “Granger representation theorem” which states that if two variables are cointegrated, then the relationship between the two can be expressed as error correction model or mechanism (ECM) (Gujarati, 2004: 825). The Error- correction term (EC_t) lagged one period (EC_{t-1}) so as to integrate short run dynamics in the long run. We specified a general error correction model (ECM) as follows:

$$\Delta \ln X_t = \beta_0 + \sum_{i=1}^n \beta_1 i \Delta \ln RER_{t-i} + \sum_{i=0}^n \beta_2 i \Delta \ln AGE_{t-i} + \beta_3 EC_{t-1} + \varepsilon_t \quad (4)$$

Where EC_{t-1} is error-correction term lagged one period. And its coefficient expected to have a negative sign. While ε_t is an error term with all classical assumptions.

3.1 Trend Analysis

Having examined the long run and short run relationship amongst the variables, also the study evaluated the trend analysis of cotton lint export earnings under the period of study from 1970 to 2010. We formulated linear trend analysis model in which we regress cotton lint export earnings (X) in natural log on time. This evaluation is imperative so as know the trend of export earnings over time. Furthermore trend analysis is important for policy implications. Decision criteria was provided by Gurajati, (2004:180-181) as follows: if the slope coefficient in the model is positive, then there is an upward trend on export earnings, where as if it is negative, it implies that there is a downward trend on export earnings on the variable under study, in our case is a cotton lint.

Trend analysis model was formulated as follows:

$$\ln X_t = \beta_0 + \beta_1 T + U_t \quad (5)$$

Where X_t is cotton lint export earnings, β_0 is a constant, T is trending variable and U_t is error term. β_1 is a trend coefficient and it is expected to be positive or negative sign.

3.2 Non-parametric test

We employ median test instead of dummy variable to evaluate the significance of trade liberalization policy adopted in Tanzania in 1986. This test is important so as see if there are any changes before and after liberalization. The median test assumes that the populations from which two samples have been drawn have the same median. The application of median test does not require the two samples to be equal after being divided.

This study finds it convenient to use in our sample of 41 observations. The division was made as follows; sample one represents the observations before trade liberalization which are 16 observations and sample two represents the observations after trade liberalization which are 25 observations.

The first step we estimated median values of both samples combined together, and thereafter we determined for each group the sample the frequencies of scores above or below the median. Our median scores were presented in 2X2 contingency table and compute the chi-squared of the contingency table. Conclusion is made based on given decision criteria, if the computed chi-squared value is greater than the critical table value, we reject null hypothesis of the sample having same median and we favor the alternative.

This study employed the following formula:

$$\chi^2 = \sum (F_o - F_e) / F_e \quad (6)$$

Where F_o is observed frequencies, F_e is expected frequencies and Σ is summation of.

4.0 Empirical Analysis

4.1 Unit root test

The study performed unit root tests at levels of all the three variables which are cotton lint export earnings, real exchange rate and agricultural earnings. All these variables were in natural logarithms. Also variables were estimated in first difference to see if there are stationary. The study employed the Augmented Dickey-Fuller (ADF) tests and the results showing the existence of unit roots as such the variables are non stationary at level. The computed absolute value of tau statistic does not exceed the critical tau value. Insert table one to three in appendix. Also variables found stationary at first difference since the computed absolute value of tau statistic exceeds the critical ADF tau value, and then we conclude that variables at first difference are stationary. Insert table four to six in the appendix below.

4.2 Cointegration Test

Having established that variables are non-stationary at level and stationary at first difference, we estimated the cointegration tests, using Johansen and Juselius (1990) and Engle-Granger (EG) test. Johansen and Juselius (JJ) (1990) test we specified the relevant order of lags (p) of the VAR model similar to Ahmed (2000). Insert table 9. Trace test indicates the existence of one cointegrating variables at the 5 percent level also Maximum Eigenvalue test indicates one cointegrating at 5 percent level. Therefore, Johansen and Juselius (JJ) (1990) indicate that there is one cointegration amongst these two variables.

Engle-Granger test employed in this study followed the similar procedure as in unit root test. However, under cointegration test we estimated cointegrating regression residual obtained in equation (2) above and we use the Augmented Dickey-Fuller tests. Gujarati, (2004) pointed out that if the computed absolute value of the tau statistic exceeds the Engle-Granger or Augmented Engle-Granger critical tau values, then we reject the null hypothesis of non stationary and the alternative hypothesis of stationary will be favored. The empirical result reveal that, computed absolute value of the tau statistic (-0.351004) exceeds the Engle -Granger critical tau values (-2.5899) at 1percent level, then we rejected the null hypothesis means that residual is stationary and this is implies that variables are cointegrated, see table 8 in appendix.

4.3 Estimation of long run relationship

Having established that the residual of the regression in equation two (2) is stationary, then variables are cointegrated as such the regression output obtained in equation (2) at level are not spurious (Engle and Granger, 1987, Gujarati, 2004:822 and Utkulu, 2012). The regression output in equation (2) representing long run relationship amongst the variables since the regression residual is stationary (cointegrated). The findings reveal that all variables are significant determinants of cotton lint export earnings in Tanzania see table 7 in appendix below.

Real exchange rate found with a positive sign which (0.269697) and statistically significant at 5 percent level which means that real exchange rate is significant determinant of cotton lint export earnings in Tanzania. This implies that depreciation of domestic currency by one percent increases cotton lint export earnings by 26.97 percent and this result is similar with other studies like Diakosavvas and Kirkpatric (1990) and Agasha (2009). Agricultural earnings as measure of agriculture productivity found with the expected positive sign (0.547602) and it is statistically significant at 5 per cent level. This implies that increasing agriculture productivity by one percent cotton lint export earnings increases by 55 percent. This result is in line with Ahmed (2000) who found agriculture productivity was significant determinant of export performance in Bangladesh. The obtained adjusted R^2 is (0.945612). This implies that real exchange rate and agricultural earnings as a measure of productivity explained the cotton lint export earnings in Tanzania by 95 per cent. The rest of percentage of cotton lint export

earnings (5 percent) can be explained by other variables which are not included in this model.

4.4 Estimation of an error-correction model (ECM)

Once a cointegration relationship amongst the variables established, that is cotton lint exports earnings, real exchange rate and agricultural earnings. We estimated an error-correction model (ECM) in order to determine the speed of adjustment of the variables in short run dynamics behavior to the long run equilibrium of cotton lint export earnings. The empirical findings found a greater coefficient of the error-correcting term; this signifies that the variables in the model are adjusting faster from the short run to the long run equilibrium. In this model, the error –correction coefficient found with expected sign which is negative (-0.329670) and it is statistically significant at 5% level and this result is in line with Ahmed, (2000). This result suggests an existence of a high speed of convergence to long run relationship (equilibrium) amongst the variables. This implies that variables adjusting to equilibrium at the speed of 33 percent per annum. Real exchange rate in short runs found with a positive sign (0.037117) but it is statistically insignificant and this finding is in line with Diakosavvas and Kirkpatrick (1990) result which found in some Sub Saharan Africa countries. However, it should be clear that, real exchange rate is still important determinant of cotton lint export earnings in short run too since it has a positive influence. The agricultural earnings found with expected sign which is positive (0.792236) and statistically significant at 5 percent level. This implies that one percent increase in agriculture productivity increases the cotton lint export earnings in short run by 79.2 percent. This signifies that agriculture productivity is vital determinant of cotton lint export earnings in Tanzania not only in long run but also in short run too. See table 10.

4.5 Trend analysis

Once the variables are cointegrated this implies that variables have long run relationship. On top of that all variables found to be significant determinants of cotton lint export earnings in Tanzania. The study estimated the trend analysis of cotton lint export earnings on time from 1970 to 2010. The empirical results reveal that cotton lint export earnings are improving since the trend coefficient is positive (0.177473) and it is statistically significant at 5 percent level. Insert table 11. This implies that cotton earnings are improving over time as such trade policy shift has a significant impact on cotton earnings in Tanzania.

4.6 Median test

The empirical results obtained from median test shows that trade liberalization have significant impact on cotton lint export earnings in Tanzania because the computed chi-squared value (25.463) is greater than critical table values of (3.84) at 5 percent level in one degree of freedom. This implies that, trade policy affected cotton lint export earnings positively. So the study rejected the null hypothesis of samples having the same median and favored the alternative, that is the samples have different median as such the trade policy is significant in Tanzania. Insert table 12. Samples to have same median means that trade policy have no any significant changes before and after trade liberalization in the economy particularly in cotton lint export earnings. From the above empirical evidence this statement has been rejected.

5. Concluding remarks

This paper has evaluated the determinants of agricultural export in Tanzania particularly on cotton lint export earnings over the period 1970 to 2010. Our study investigates empirically the determinants of agricultural export by analyzing real exchange rate and agricultural earnings as measure of agricultural productivity. The empirical evidence from our study suggests that real exchange rate and agricultural earnings as measure of agricultural productivity significantly determined the cotton lint export earnings in Tanzania. The findings reveal that, after trade liberalization cotton lint export earnings showed improvement. It is important to stress that agricultural export in Tanzania demands an appropriate agricultural trade policy and good macroeconomic incentives like agriculture production schemes and good infrastructure. Thus, from the empirical evidences obtained in this paper on agricultural export, it suggests that, Tanzanian agricultural exports are primarily determined by internal factors like real exchange rate and agricultural productivity capacity. Also error correction modeling in our study find a unique equilibrium relationship amongst the variables which are cotton lint export earnings, real exchange rate (RER) and agricultural earnings (AGE). All the variables in short run have emerged as important determinants of the cotton lint export earnings in Tanzania. The error correction term in the model is found to be statistically significant at 5 percent level, and this suggests a high speed of convergence to equilibrium. The coefficient estimate of the error correction term in our model is (-0.329670) and this implies that variables adjusting to long run (equilibrium) at the speed of 33 percent per annum as such confirming the validity of the long run relationship (equilibrium) amongst the variables. This indicates a high speed of adjustment of variables to equilibrium. Our empirical estimate of the real exchange rate indicates an increase in Tanzanian export competitiveness on cotton lint since it was found statistically significant in long run albeit in short run it was insignificant. Agricultural productivity was found superb both in short run and long run. The coefficients of the

variable in short run and long run respectively were statistically significant at 5 per cent level. This implies that agricultural productivity is significant determinant of cotton lint export earnings in Tanzania. Trend analysis reveals that, cotton lint export earnings have improved tremendously since the trend coefficient found it is statistically significant at 5 percent level. Non parametric technique via median test finds that, trade policy shift from controlled to liberalized trade has significant changes on cotton lint export earnings in Tanzania. The policy implications of our paper in Tanzanian economy are straight forward. For Tanzanian agricultural sector to attain a rapid export growth in her agricultural cash crops like cotton, cloves, cashew nuts amongst others, internal determinants (internal factors) are essential factors for export purposes. Real exchange rate and agricultural productivity capacity are amongst of the determinants which should be taken care off in order to earn more foreign currencies in Tanzania.

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Appendices

Unit root test at level

Table 1:

Null Hypothesis: LNEXPORT has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.730393	0.8274
Test critical values:		
1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

Table 2:

Null Hypothesis: LNRER has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=9)

	t-Statistic
Augmented Dickey-Fuller test statistic	-1.032844
Test critical values:	
1% level	-3.610453
5% level	-2.938987
10% level	-2.607932

Table 3:

Null Hypothesis: LNAGE has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.201722	0.6644
Test critical values:		
1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

Unit root test at first difference

Table 4:

Null Hypothesis: D(LNEXPORT) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.063310	0.0000
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

Table 5:

Null Hypothesis: D(LNRER) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.915892	0.0000
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

Table 6:

Null Hypothesis: D(DLNAGE) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.40885	0.0000
Test critical values: 1% level	-3.615588	
5% level	-2.941145	
10% level	-2.609066	

Long run coefficients

Table 7:

Dependent Variable: LNEXPORT
 Method: Least Squares
 Date: 01/02/14 Time: 14:08
 Sample: 1970 2010
 Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.23579	0.582626	24.43384	0.0000
LNRRER	0.269697	0.098867	2.727861	0.0096
LNAGE	0.547602	0.090499	6.050922	0.0000
R-squared	0.948331	Mean dependent var		22.47897
Adjusted R-squared	0.945612	S.D. dependent var		2.274153
S.E. of regression	0.530362	Akaike info criterion		1.639842
Sum squared resid	10.68879	Schwarz criterion		1.765226
Log likelihood	-30.61677	F-statistic		348.7259
Durbin-Watson stat	0.680376	Prob(F-statistic)		0.000000

Testing for cointegration

Engle –Granger test

Table 8:

Dependent Variable: DRESID02
 Method: Least Squares
 Date: 01/02/14 Time: 14:27
 Sample (adjusted): 1971 2010
 Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SER02	-0.351004	0.119555	-2.935926	0.0056
R-squared	0.180520	Mean dependent var		-0.010433
Adjusted R-squared	0.180520	S.D. dependent var		0.431695
S.E. of regression	0.390792	Akaike info criterion		0.983400
Sum squared resid	5.956022	Schwarz criterion		1.025622
Log likelihood	-18.66801	Durbin-Watson stat		2.139643

Johansen and Juselius (1990)

Table 9

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.579925	47.16039	35.19275	0.0017
At most 1	0.197040	13.33479	20.26184	0.3377
At most 2	0.115265	4.776223	9.164546	0.3088

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.579925	33.82560	22.29962	0.0008
At most 1	0.197040	8.558563	15.89210	0.4825
At most 2	0.115265	4.776223	9.164546	0.3088

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Error correction model

Table 10:

Dependent Variable: DLNEXPORT

Method: Least Squares

Date: 01/02/14 Time: 14:33

Sample (adjusted): 1971 2010

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNRER	0.037117	0.081596	0.454883	0.6519
DLNAGE	0.792236	0.237633	3.333872	0.0020
Ect-1	-0.329670	0.111603	-2.953939	0.0054

R-squared	0.308658	Mean dependent var	0.150613
Adjusted R-squared	0.271288	S.D. dependent var	0.424992
S.E. of regression	0.362793	Akaike info criterion	0.882069
Sum squared resid	4.869888	Schwarz criterion	1.008735
Log likelihood	-14.64137	Durbin-Watson stat	2.024912

Trend analysis

Table 11:

Dependent Variable: LNEXPORT

Method: Least Squares

Date: 01/02/14 Time: 14:40

Sample: 1970 2010

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.75205	0.260171	72.07578	0.0000
TREND	0.177473	0.010794	16.44221	0.0000
R-squared	0.873928	Mean dependent var		22.47897
Adjusted R-squared	0.870695	S.D. dependent var		2.274153
S.E. of regression	0.817763	Akaike info criterion		2.483061
Sum squared resid	26.08068	Schwarz criterion		2.566650
Log likelihood	-48.90275	F-statistic		270.3464
Durbin-Watson stat	0.271196	Prob(F-statistic)		0.000000

Non parametric test – Median test

Table 12: Contingency table

SAMPLE	I	II	TOTAL
ABOVE MEDIAN	0	20	20
BELOW MEDIAN	16	5	21
TOTAL	16	25	41

EF

7.8	12.2
8.2	12.8

Chi-squared
 =25.463