

Cloves Export Response to trade liberalization in Tanzania: A Cointegration Analysis

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Abstract

This paper investigates the cloves export response in Tanzania before and after trade liberalization from 1970 to 2010. The econometric and nonparametric techniques have been applied. Econometric techniques include cointegration, error correction modeling approach as well as the trend analysis. Error correction modeling approach its empirical findings revealed that there exists a long run or equilibrium relationship amongst the variables that is cloves export earnings, world price and real exchange rate. The short run (short term dynamic behavior) of Tanzania's cloves export response to trade liberalization has been investigated through the error correction model. Empirical results on error correction model were found to be correctly signed. The coefficient estimate of the error correction term in this model indicates a high speed of adjustment of variables to equilibrium. This implies that variables adjusting to equilibrium at the speed of 78 percent per annum as such confirming the validity of the long run equilibrium relationship. World price also has been found to be correctly signed and statistically significant at 5 percent as such is one of the important determinants of cloves export supply. On other hand real exchange rate as well found with correct sign but statistically insignificant and dummy variable which captured the effect before and after trade liberalization found to be an important determinants of cloves supply since it has a positive sign, however it is statistically insignificant. Trend analysis of cloves export earnings found to be improving. Generally, robustness has also found in error correction model used in this study since it provided with relevant information about diagnostic tests. A non parametric technique revealed that shift of trade policy in Tanzania is statistically significant at 5 percent level.

Keywords: Trade liberalization, export response or performance and agricultural export.

1.0 Introduction

Prior to trade liberalization strategy, Tanzanian economy had the protectionism policy which was implemented through import substitution industry strategy which favored more production for domestic market and less effort vested in production for exports as such created bias against the export sector. This bias worsened the economic performance of the country at large. Bias against export sector created severe imbalance of payments as such the country experienced inadequate foreign currencies to finance the social and economic development (Kanaan, 2000). Alternative to such a shortage the country embarked on foreign borrowing so as to finance social and economic projects.

Apart from favoring the domestic market, protectionism under the name of import substitution industry strategy also was involved in the exchange rate control. In the exchange rate control, government used to fix the exchange rate (price of domestic currency against the foreign currencies), normally used to appreciate the value of domestic currency against the foreign currencies. Altogether, these tendencies of favoring domestic production and exchange rate control affected the export sector of Tanzania tremendously (Bigsten and Danielson, 1999 and Kanaan, 2000).

Bias against export sector implicitly affected the foreign trade tremendously as such their impacts were felt vividly in the macroeconomic sectors. Particularly, the production sectors like agricultural and manufacturing sectors, saving and investments, infrastructures but to mention a few were severely affected due insufficient foreign currencies to finance the development and current expenditure (Kanaan, 2000). The effect in those sectors resulted into severe economic crisis in Tanzanian economy in late 1970s and mid 1980s. Such economic crisis experienced in Tanzanian economy necessitated the economic restructuring so as to rescue the economic situations in Tanzania by that time.

Tanzanian government having experienced such an economic crisis mentioned above, in 1986 embraced the idea of the structural adjustment programme popularly known as Economic Recovery Programme (ERP) in which

the trade liberalization was launched (Bigsten and Danielsson, 1999). Structural adjustment programme was propagated by the international organizations which were World Bank and International Monetary Fund (IMF) (Bigsten and Danielsson, 1999). The first prominent liberalization phase carried out in Tanzania was Economic Recovery Programme (ERP) which was launched in June, 1986 up to 1989. Thereafter, ERP was followed by the Economic and Social Action Programme (ESAP) of 1989 to 1992. Generally, the period from 1986 to 1990, liberalization processes carried out into various areas such as devaluation of domestic currency, increasing the domestic currency price of imports and increasing the return to exports so as to improve the export sector at large (Mackay et al. 1997).

Trade liberalization process in Tanzania was implemented in two main areas which were import liberalization and export promotion. Export promotion was focused on shifting a trade from a situation of anti-export bias to free trade whereas import liberalization was instituted for the purpose of reducing import restrictions as such renders easier ways of importing goods. Also import liberalization relaxed the import restrictions or reduces prices particularly tariffs.

Apart from removing anti-export bias against foreign trade export promotion was also mostly concerned with increasing the incentives to export and encourages resource reallocation from non exportable goods to exportable goods or sector. On top of that, export promotion was also involved in devaluation process. Devaluation of domestic currency against foreign currencies was implemented so as to enhance the export growth. Export promotion in Tanzania some time was done by providing direct export incentives (Mackay et al. 1997). While Tanzania was implementing trade liberalization policy in 1986, Ahmed (2000) asserted that the essence of trade liberalization is to reduce the anti-export bias as well as making exports more competitive in international markets through correcting trade biases like overvalued exchange rate as such creating incentives for expanding export, agricultural export being among them.

The process of liberalizing trade in Tanzania was taken gradually. The government started by removing the trade barriers to trade such as barriers to imports and exports as mentioned above. Barriers which were removed gradually were imports and exports licenses, import restrictions and higher tariffs for imported goods and import quotas (Kannan, 2000). However the process take so long time to be accomplished due to the fact that Tanzanian economy were under socialist path, so the government was required to restructure economy gradually from socialist economy to market oriented economy. Changes from socialist to market economy involved changing the marketing boards which initially were state owned to private ownership. Moreover, it should be clear that, reducing the trade barriers had economic implications that were reducing government revenues that is, why that process took a long time to be accomplished in Tanzania.

To ensure successful process of trade liberalization in Tanzania, also the government abandoned export licenses and registration of export companies. To abandon export licenses and registration of export companies' means that companies were allowed to export their products freely, all that was done in 1993/94. In 1999 government again removed all forms of export restrictions. On other side, government also reduced the import tariff rate gradually since that side had more economic implications as mentioned earlier on. Reducing import tariffs means reducing the government revenue as such may harm the entire economy at large. Between 1980 and 1986 import tariffs were 40 percent, but with imposition of trade liberalization, in 1986 import tariffs were reduced from 35 per cent to 23 percent in 1988 respectively. On top of that, in 1999 tariffs rate were reduced to between 20 and 15 percent. The issues of import licensing were removed in 1993 (Kannan, 2000). Trade liberalization was done purposely so as to regain economic status which was not there due to protectionism policy which ran for almost two decades and half.

Liberalizing trade in Tanzanian economy was assumed to be a panacea for reviving macroeconomic variables such as economic growth, export growth, relaxing balance of payments problems, savings, and investments. Also trade liberalization was viewed as gear towards transforming many economic sectors from inward looking to outward looking in terms of production structures. Outward looking is the way of transforming the economic sectors to produce for domestic purpose as well as for export purpose so as to revive the export sector which was severely affected by the inward looking policy adopted in Tanzania economy since 1960s to mid 1980s.

Consequently, trade liberalization was expected to improve exports. The main exports from Tanzania are agricultural products, followed by minerals and manufacturing products. Agricultural products (primary products) exported are cotton, cashew nuts, tobacco, tea, cloves, coffee, pyrethrum and sisal among others. Minerals exported include Tanzanite, Gold and Diamond. Fishing industry also contributed in export such as fish fillets which are exported to European countries whereas from manufacturing industry commodities exported are textile clothes, petroleum products from refined crude oil, wheat and corn flour (URT, 2004). Notably, the

exported oil is imported from oil producing countries such as the United Arab Emirates.

1.1 Liberalization process on agricultural sector

1.1.1 Importance of agricultural sector in Tanzanian economy

Trade liberalization on agricultural sector in Tanzania was so important because Tanzanian economy was largely depending on exporting agricultural products for earnings foreign currencies. Looking at the records since independence, agricultural sector was one of the sectors which were performing well amongst of the sectors in Tanzanian economy. The sector employs a significant number of labor force compared with other economic sectors in Tanzania. Agricultural sector contributed almost 26 percent to the Gross Domestic Product (GDP) (URT, 2009). In terms foreign earnings, agricultural sector contributed more than sixty (60) percent. In 1980s agricultural sector was one the best performing sector in contribution to the gross domestic product. Study by Mackay et al. (1997) presented the data regarding agricultural sector as follows: in 1981-83, real GDP fell by one (1) percent whereas agricultural GDP rose by two (2) percent. Concurrently, in 1984-1985 real GDP rose by two point six (2.6) percent while agricultural GDP increased by six (6) percent. On top of that in 1986 to 1992 agricultural GDP increased by four point seven (4.7) percent whereas real GDP rose only by four point two (4.2) percent.

Subsequently, agriculture rose from 45 percent of GDP in 1980 to about 60 percent in 1990 in which that was spectacular contribution in Tanzanian economy (Mackay et al. 1997). However, in that impressive contributions, large portion was coming from food stuffs and little from export of cash crops like cotton, cashew nuts, tea, coffee, cloves but to mention a few.

It is of interest to note that, recently agricultural sector contributions to Gross Domestic Product (GDP) are declining over time. According to URT, (2010) data cited in Adam's paper of 2009 revealed that in years 1996, 2000 and 2002 the contributions were decreased tremendously from 57 percent, 44 percent and 23 percent respectively. On top of that in 2007 the contribution went down up to 14.6 percent whereas in 2008 the contributions slightly improved by one percent to 15.6 percent but still lower than the previous years.

1.1.2 Tanzanian agricultural sector liberalization process

Having seen the importance and contributions of agricultural sector in Tanzanian economy, agricultural sector was liberalized in the same year 1986 though it was in gradual pace. Tanzanian government in the mid-1980s to early 1990s took a series of agricultural policies reforms in order to restructure the agricultural sector. The activities were funded by the donors so as to make sure that the agricultural sector was transformed from state owned to market oriented economy (Bigsten and Danielsson, 1999 and Rweyemamu, 2003). The government instituted the price mechanism in cash crops markets. Price mechanism implies that, the force of demand and supply was responsible in setting the price of agricultural products rather than government intervention in fixing price of agricultural products.

On top of that, Tanzanian government liberalized imports activities regarding agricultural sector such as agricultural inputs, devalued the domestic currency against foreign currencies in favor of export of agricultural produce. Also removed the government subsidies in parastatal and raising bank interest rates by leaving the financial market to fix the interest rather than government intervention. Again, price control on consumer goods in food market was reduced and raising prices for export crops so as to enhance the economic growth. Market force as well was left to fix the price of agricultural produce rather than marketing boards (Bigsten and Danielsson, 1999 and Rweyemamu, 2003).

Moreover, under Economic Recovery Programme (ERP), the government dealt in improving the efficiency of the marketing boards. They increased producer prices for export crops and removed price control over the cash crops. For instance in 1988/1989 they relaxed the price control 388 out of 400 in which not all were related to agricultural products (Mackay et al. 1997). Furthermore, agricultural sector policy reforms continued to evolve towards market oriented. In 1993 up to 1997, Tanzanian government continued to reduce her intervention in the agricultural sector depending on the weight of the crops or nature of farming being household farming or state farming. State farming crops took so long time to be liberalized than households farming crops such as sisal and cotton respectively (Rweyemamu, 2003).

In the second phase under Economic and Social Action Programme (ESAP) which runs from 1989 to 1991, the government reduced protection or tariff levels to required level and restructured marketing boards particularly in 1990. And in 1991 they liberalized the access to inputs for the agricultural producers (Mackay et al. 1997). Despite all the strategies instituted, trade liberalization launched in 1986 in Tanzania had done little in promoting

agricultural exports. Reasons behind that little contribution of trade liberalization on agricultural export growth were the nature of liberalization undertaken in which was principally based on making import easier rather making good strategies which would improve agricultural export. Also the devaluation of domestic currency did not improve agricultural export as expected because the prices did not trickle down to producers directly.

After liberalization of agricultural sector, export performance on agriculture sector remains a problem since the exports are decreasing drastically. For instance in 2010 cloves export decreased as compared to 2009. In 2010 cloves exports values decreased to USD 7.6 million from USD 14.7 million in 2009. Moreover, cloves export volumes decreased from 4,800 tons in 2009 to 2,200 tons in 2010. In addition, cloves unit price in the world market increased substantially. In 2009, average price in the world market increased from USD 2,977.9 million per ton to 3,449.6 million per ton in 2010 respectively. That increase equals to 15.8 percent as compared to the previous year (URT, 2010). However, the liberalization process took place gradually and is still under implementations depending on the nature of sub sector and type of crops under consideration. For that matter, this study intends to examine the cloves export response after trade liberalization on agricultural export performance due to the fact that cloves is among of leading agricultural export from Tanzania.

2.0 Literature

2.1 Definition of trade liberalization

Trade liberalization has been defined differently by various scholars. For example Mackay et al.1997:131 defined trade liberalization as the removal of restrictions on imports and reduction of discrimination against export. Whereas Zulfikar and Kausar, (2012: 32) defined Trade liberalization as the reduction and gradual elimination of tariff and non tariff trade barriers which may obstruct the free flow of goods and service across national borders. Looking at the definitions given above it shows that, trade liberalization is the removal or reduction of trade barriers which prevent the smooth trade transactions of goods and services among trade partners. Trade barriers include tariff and non tariff. Non tariff included duties, export subsidies and import quotas, import regulations like licensing regulations amongst others. Moreover, trade liberalization also viewed as reduction of government incentives and trade restrictions between trading countries (World Bank 2001 cited in Allaro, 2012). In tandem with those definitions, trade liberalization in this study will be considered as the tendency of Tanzanian government to relax trade restrictions to nearly free trade among trade partners.

The theory of trade liberalization was propounded by the neo-liberal supporters who were against the protectionism policy under the name of import substitution industry strategy (inward looking strategy). Krueger in 1970s cited in Krueger (1997), Dornbusch, (1992) and Jenkins (1997) asserted that trade liberalization is an important strategy for economic performance. Trade liberalization leads to an increase in the export performance, an improvement in the balance of payment; an increase in the import capacity of the countries that liberalized the trade, an increase in productivity growth rate and leads to an increase in the economic growth at large.

In comprehending with the theory of trade liberalization Mesike et al. (2008) found that, trade liberalization brings static and dynamic gains among the trade partners. Static gains mostly include resource allocation within and across industries in a liberalized country whereas dynamic gains can be obtained through technical change, learning and growth leading to improved productivity growth in a respective country.

Therefore, the notion of trade liberalization become so influential in many developing countries following economic failure particular those countries which adopted inward looking strategy in 1970s and 1980s. Consequently, many developing countries in 1980s started to embark on outward looking strategy (Paulino, 2003 and Penélope, 2005). Tanzania being among of developing countries, liberalized the trade in 1986 so as to revive the economic growth through improving the export performance, increase the import capacity, relaxing the balance of payments constraints and increasing productivity growth rate.

2.2 Empirical review

Many studies undertaken so far which examined the impact of trade liberalization on export response on liberalized countries had revealed mixed findings. Some studies found positive relationship between trade liberalization and export supply whereas others found negative or weak relationship between trade liberalization and export supply to some developing countries.

It is of interest to note that, these studies reviewed had been employing range of techniques like cointegration analysis using autoregressive distributed lag (ARDL), residual analysis, error correction model (ECM) or vector error correction model (VECM). Other studies employed cross section data analysis and analytical studies. Apart from those techniques described earlier on, also gravity model and panel technique were being employed to

examine the impact of trade liberalization on export response on agricultural products. Interesting, all these techniques produced different results on the variables studied in the country's concern. However, it should be clear that the word export response in other literatures termed as export performance. For that matter in this study the word export response and export performance will be used interchangeably. The empirical review viewed all papers under the name of export response, export performance and determinants of agricultural export crops to trade liberalization.

2.2.1 Literature of trade liberalization and export response in the rest of African countries

Some studies which are viewed in the rest of African countries found with mixed results about impact of trade liberalization on export response/performance. Some literatures found positive relationship between trade liberalization and export response whereas some studies found negative or weak relationship between trade liberalization and export response. Some of the literatures viewed were from Bangladesh, Pakistan, ASEAN countries, OIC countries, Mexico and amongst others. Some of the papers which found a positive relationship between trade liberalization and export response were Ahmed (2000), Bashir, (2003), Santos-Paulino (2003), Pacheco-López (2004) but to mention a few. For instance study by Ahmed (2000) conducted in Bangladesh examined the impact of trade liberalization on export performance. The study employed the vector autoregressive (VAR) and vector error correction model (VECM) to estimate the impact of trade liberalization on export performance from 1974 to 1995. In that study real quantity of aggregated merchandise export being dependent variable was regressed against relative prices of export, real effective exchange rate and real gross domestic product and dummy variable. Dummy variable was instituted to capture the changes before and after trade liberalization. The findings revealed that, trade liberalization in Bangladesh improved export performance. Albeit dummy coefficient was found to be very small in magnitude signifies that impact of trade liberalization on export performance in Bangladesh was still very small under the period studied from 1974 to 1995. Error correction term found to be significant, means that variables adjusting towards the long run equilibrium. These results concurred with the assumptions that trade liberalization improves export performance of liberalized country.

Again, other studies which affirmed the theory of trade liberalization that improves export response or performance are Bashir, (2003), Santos-Paulino (2003), Pacheco-López (2004). All these studies found that, trade liberalization improved the export growth of the studied countries which were Pakistan, Dominican Republic and Mexico respectively. For example, Santos-Paulino (2003) and Pacheco-López (2004) conducted the studies using similar technique in Dominican Republic and Mexico respectively. The studies employed cointegration techniques using autoregressive distributed lag (ARDL) model testing the long run relationship amongst the variables. Variables studied were real export as dependent variable and explanatory variables were real exchange rate and United State income in case of Dominican Republic. Dummy variables were included in both studies to capture the impact of liberalization in the respective countries. Their Findings revealed that devaluation of currency increases the export performance albeit, the United State income found to be negatively related with export performance in Dominican Republic signified that the United State income had little influence in improving Dominican Republic export whereas trade liberalization in Mexico improved significantly the export performance. The dummy variables provided remarkable results, were quite significant means that trade liberalization increased export performance both in Dominican Republic and Mexico. As such the theory of trade liberalization was in line with study carried out in Mexico and Dominican Republic.

Similarly, Bashir, (2003) investigated the impact of trade liberalization on export performance on agricultural sector in Pakistan from 1961 to 2000 using the same technique. The study used the volume of agricultural export as dependent variable and explanatory variables were world demand, export competitiveness, export diversification and openness to trade. The findings revealed that, trade liberalization in Pakistan improved the agricultural export performance tremendously. However, Pakistan balance of payments deteriorated during the trade liberalization process.

Other studies like Majeed and Ahmad, (2006), Malik, (2007) and Mahmood et al. (2008), also they examined the impact of trade liberalization on export performance. Their findings revealed that, trade liberalization improved export growth of the agricultural products in the countries under study. However, these countries produced different magnitudes responses on trade impact on their respective crops. Majeed and Ahmad (2006) examined the determinants of exports in developing countries using panel observation for seventy five (75) countries from 1970 to 2004. In that study, main variables studied were Foreign Direct Investment, growth rate of Gross Domestic Product, Official development assistance as a percentage of Gross Domestic Product, Gross domestic production, National savings as a percentage of Gross Domestic Product, Indirect taxes as a percentage of Gross

Domestic Product, Total labor force, Real exchange rate to mention a few. The empirical results revealed that, all variables under study were statistically significant determinants of exports in developing countries except the foreign direct investment which found to be positive but statistically insignificant, this signifies that the role of foreign direct investment in many developing countries remains contradictory phenomenon mostly depends on the motive behind the country for such foreign direct investment being to promote the export performance or being used as import substitution strategy.

Subsequently, Malik (2007) conducted study in Pakistan and evaluated the impact of economic reforms and trade liberalization policies on agricultural export performance from 1961 to 2000. Variables studied were domestic supply side and world demand factors on agricultural export performance. The long run and short run relationship amongst the variables was established using cointegration and vector error correction model (VECM) technique respectively. Malik's findings reveal that, agricultural export performance in Pakistan found to be sensitive to the domestic supply side factors rather than world demand factors. This signifies that, policy had positive impact on agricultural sector in Pakistan. Trade liberalization improved the agricultural exports in long run in Pakistan. In the same vein Mahmood et al. (2008) reviewed number of studies regarding on the impact of trade liberalization on agriculture in Pakistan. The summary from those studies suggested that, trade liberalization in Pakistan affected the social and economic status of many farming communities. They asserted that, the increase in prices of rice in international market was good for farmers but the situations were worse to the producers of maize and wheat. However, the economic situations of the country after trade liberalization marked positive gross domestic product growth as well as a substantial increase in foreign direct investment.

Also study by Anwar et al. (2010) examined the impact of trade liberalization on cotton lint in Pakistan. The study covered the period from 1971 to 2008 employed cointegration technique. In their analysis, they examined three main variables which were openness to agricultural trade, competitiveness and concentration of export. The empirical results showed that, domestic and international trade policies as explanatory variables had positively influenced the export performance of cotton lint in Pakistan. Furthermore, world demand, export competitiveness and out ward looking (openness) increased the export performance of cotton lint.

2.2.2 Literature of trade liberalization and export response in African countries

With no exception of African countries, studies were conducted as well so as to evaluate the applicability of the theory of trade liberalization on export response or performance after they adopted a new trade policy.

2.2.2.1 Literature of trade liberalization and export response in West African countries

Currently in West Africa there are sufficient studies regarding trade liberalization and its impact on agricultural export response. Many studies found positive relationship between trade liberalization and export performance of agricultural produce. For instance Mesike et al. (2008) analyzed the effect of trade liberalization policy on Nigerian rubber industry using secondary data from 1960 to 2004. They examined the effect of trade liberalization on rubber industry using both the external and internal determinants variables on export performance. Internal variables examined were quantity of rubber output, exchange rate, annual rainfall, average producers price as well as average domestic consumption whereas external variable was average world price. Their empirical results revealed that, quantity output of rubber and produce price were so significant determinants of export performance of rubber in Nigeria whereas domestic consumption and rainfall were not significant determinants of rubber exports similar to the world price. It is important to stress that, many studies viewed so far have affirmed trade liberalization theory in developing countries through with slight differences.

Folawewo and Olakojo (2010) examined the determinants of agricultural export in oil exporting economy particularly in Nigeria using cointegration analysis from 1970 to 2007. In order to capture the determinants of agricultural exports they employed the world price, world income and Nigeria's past agricultural output. In this study they used both internal and external determinants of agricultural export performance. The empirical findings reveal that, both internal and external determinants found to be significant determinants of agricultural export in Nigeria. Furthermore, the internal determinant that is agricultural output was so significant compared to the external determinants.

In the same vein Abolagba et al. (2010) examined the determinants of agricultural export in Nigeria particularly on cocoa and rubber. The study employed the ordinary least squares and the main variables studied were volume of export quantity of cocoa and rubber as explained variables whereas the explanatory variables were average price of cocoa and rubber, average world price of cocoa and rubber, exchange rate, domestic consumption, average rainfall and interest rate from 1970 to 2005. The empirical results revealed that, rubber export was influenced by the internal factors such as domestic rubber production, producer price, exchange rate, domestic

consumption and interest rate whereas cocoa was significantly influenced by the domestic consumption and rainfall.

Similarly, Amoro and Shen (2012) replicated the study in Cote d'Ivoire using similar techniques from Abolagba et al. (2010) who studied the impact of trade liberalization on agricultural products in Nigeria. They examined the determinants of agricultural exports in Cote d'Ivoire particularly in cocoa and rubber. The findings reveal that, rubber export in Cote d'Ivoire was significantly influenced by the domestic production, exchange rate, and interest rate and domestic consumption whereas domestic consumption and rainfall significantly influenced the export of cocoa. On other hand, world price found to be insignificant. Indeed, Amoro and Shen (2012) got similar results as those in Nigerian agricultural products that, the internal determinants of export performance still dominating the export performance of many less developing countries such as Nigeria and Cote d'Ivoire. Notably, this study comprehends our study's assumptions towards examining the cloves export response in Tanzania.

The study by Idoge et al. (2012) also investigated the similar sector, which is agricultural sector on the determinants of export-led cassava production intensification among small-holder farmers in delta state in Nigeria. The findings reveal that, there was a slow increasing trend of cassava in export opportunities in delta state in Nigeria. However, credit availability, cassava's production domestic prices, labour and extension contact had positive impact on cassava's output. Whereas market system, inadequate finance and labour cost had negative impact on cassava production. Theory of trade liberalization affirmed in West African countries too, similar to Pakistan and Bangladesh.

2.2.2.2 Literature of trade liberalization and export response in North Africa

Concurrently, in North African countries studies were undertaken as in West African countries. In similar vein they examined the impact of trade liberalization on export response on agricultural produce. The studies revealed that trade liberalization improved the export performance of the respective countries under study. For instance, Abbas et al. (1996) examined the impact of agricultural trade liberalization on Egyptian agricultural sector using gravity modeling analysis. Study pointed out that, agricultural trade liberalization under rice policy reforms found to be not much significant but the reforms provides the significant gains in the export promotion in other agricultural crops rather than rice as such study brought about mixed results. Generally, trade liberalization improved export performance of agricultural crops in Egypt.

Not only in Egypt where they obtained positive results but also in Morocco and Tunisia as well they found positive relationship between trade liberalization and export performance. A study by Mouna and Reza (2001) conducted in Algeria, Morocco and Tunisia from 1980s to 1990s using Auto Regressive Distributed Lag (ARDL) approach examined the impact of trade liberalization on export growth. Main variables studied were volume of exports being dependent variable and independent variables were the real exchange rate and export diversification. The study revealed that, trade liberalization increased the export performance in two countries significantly which were Morocco and Tunisia. Algeria found performing poorly compared to the rest two countries because of appreciating the currency (dinar) as such discouraged the export. Moreover, the devaluation of currency found to be a vital internal determinant of export growth.

Apart from Egypt and Morocco and Tunisia, Ethiopian study also revealed similar results. A study by Allaro (2010) examined the export performance of oilseeds and its determinants in Ethiopia from 1974 to 2009. The main variables studied were oilseeds as explained variable whereas the explanatory variables were world price, domestic price, real output and nominal exchange rate. The study employed cointegration techniques to analyze the export performance of oil seeds in Ethiopia. The findings revealed that, real output and nominal exchange rate were the most significant determinants of export performance of oil seeds in Ethiopia.

Again Hatab et al. (2010) employed gravity model in Egypt to examine the determinants of Egyptian agricultural export over the period from 1994 to 2008. Hatab et al. used the Egypt's Gross Domestic Product, Gross Domestic Product per capita, exchange rate, transport costs and population as explanatory variables against the export volumes as explained variable. Their results revealed that, Egypt's Gross Domestic Product increases the export performance (one percent increase in Egypt's Gross Domestic Product results in roughly a 5.42 percent increase in Egypt's agricultural export flows) whereas Gross Domestic Product per capita found to be negatively related with export performance. On other hand the exchange rate had significant contribution to export performance in Egyptian agricultural produce while transportation costs had negative impact on export performance of agricultural exports.

2.2.2.3 Literature of trade liberalization and export response in Sub Saharan Africa countries

In sub Saharan African countries there are some studies which examined the impact of trade liberalization on export response too. The SSA mainly exports agricultural produce. In order to ascertain or not ascertain the theory of trade liberalization in SSA Chitiga et al. (2008) they studied agricultural trade policy reforms in South Africa and found that trade policy reforms had positive impact on agricultural export performance in South Africa. Gains from trade found to be three times higher when the trade tariffs were done extensively with trade partners. Similarly, Babatunde (2009) examined the impact of trade liberalization on export performance in Sub Saharan Africa countries from 1980 to 2005 and Study employed the panel least squares estimation technique. Results revealed that, trade liberalization stimulated the export performance of the Sub Saharan African countries though marginally and indirectly. It was observed that, trade liberalization influenced the export performance indirectly through importation path. This implies that, importation of more capital inputs eventually improved the export performance through increasing the productivity of a particular country. In addition to that, presence of competitive environment and stable real effective exchange rate stimulated export performance in Sub Saharan Africa countries.

Tanzania in particularly, Tamini et al. (2012) examined the impact of trade liberalization in egg sector in Tanzania. The study employed gravity model similar to Hatab et al (2010) and Susanto et al (2012). The gravity model took the account of observed persistence of trading partners. The findings reveal that, presence of aggressive trade liberalization had little trade gains amongst the trading partners. Therefore, trade liberalization in Tanzania had little evidence that had improved export sector as it is expected. However, the results cannot be generalized since it considered only egg sector whereas export sector in Tanzania includes agricultural products (traditional products) and non- traditional products. Therefore, this study will focus on agricultural products so as to check for cloves export response to trade liberalization in Tanzania.

In sub Saharan Africa countries also were not free from getting mixed findings. A study by Ackah and Morrissey, (2005) examined trade policy and performance in sub Saharan African since 1980s. Their findings revealed that trade liberalization particularly in sub Saharan African countries increased the imports tremendously but export growth had not improved significantly as such there were increases in trade deficit in the countries under study.

2.2.2.4 Cross countries studies of trade liberalization and export response

Apart from single country analysis, trade liberalization also was examined under cross countries perspectives with the assumption that those countries have similar geographical environment and policy set up. An influential paper by Yeboah, (2008) examined the impact of trade liberalization on export performance, particularly determinants of agricultural products in sixteen West African countries from 1989 to 2003 under bilateral context with US. Major crop examined was cocoa. Study found that, resource endowment, relative size of economies (Gross Domestic Product) and sum of bilateral Gross Domestic Product of United State of America and exporting countries, were the major determinants of agricultural product. Trade liberalization increased the world price of cocoa and export share.

It is of interest to note that impact of trade liberalization on agricultural export response was found to be positive for many developing countries. For instance Susanto et al. (2012) employed gravity model in analyzing trade liberalization's impact on agricultural products for seventy eight countries from the period of 1980 to 2010. Their findings revealed that, reduced tariff rates, less restrictive credit country as well as less government interventions found to be better off in influencing agricultural export performance. Furthermore, study reveals that, the impacts of reforms varied significantly across the countries as well as reform forms. Generally, trade reforms found to be necessary in order to stimulate the agricultural export performance of the countries concerned.

In contrast, other studies found negative or weak relationship between trade liberalization and export performance. Such studies were Shafaeddin (1995), Niemi (2001) and Ghani (2011). For instance, Shafaeddin (1995) examined the impact of trade liberalization on export and gross domestic product growth in least developed countries particularly in Africa and found weak relationship between trade liberalization and export performance. The study asserted that least developed countries have been tremendously marginalized in international business since they are heavily depend on production and exporting of the primary produce as such deterred their fully utilization of the international trade opportunities. The empirical results from those countries revealed that there were no clear and systematic association between trade liberalization and devaluation of domestic currencies as well as no clear relationship between growth and export diversification of output with trade liberalization in least developed countries. Surprising, the study found that trade liberalization in least

developed countries were associated with deindustrialization in many African countries under study. The study recommended that the least developed countries should build their supply capacity in order to be in position to compete with developed countries.

Similarly Niemi (2001) examined the impact of trade liberalization on export performance in Association of Southern Asian Nations, using the demand side scenario between ASEAN and EU. The assumption towards that study was that, agricultural exports from ASEAN were highly dependent on the markets of the European Union industries. The empirical results revealed that trade liberalization focusing on reducing trade tariffs was not significant in influencing the amount of quantity of imports demanded to the trade partner (EU) as such export performance of the commodity from ASEAN was not impressive as it was expected. On other hand, Ghani (2011) examined the impact of trade liberalization on export performance in Organization of Islamic Conferences countries and the findings revealed that, trade liberalization did not improve export performance of OIC member countries in long term as compared in medium term.

Therefore, the ongoing debates on the impact of trade liberalization in developing countries motivated this study to be under taken in Tanzania. However, we cannot say that the included literatures are exhaustive ones in the board of literatures available in this research topic rather we pick up the one we think are closely related with our study.

3.0 Methodology

The study employed the cointegration technique to examine the cloves export response to trade liberalization in Tanzania similar to many other researchers such as Ahmed (2000), Bashir, (2003), Penélope-López, (2005) Agasha, (2009), Allaro, (2010) and Allaro, (2012) but to mention a few. This technique has been found to be superior to other techniques like panel and gravity modeling for being able to establish the short run and long run relationship amongst variables while other techniques cannot determine the short run and long run relationship between variables. Also this technique estimated the unit root and cointegration test. Granger, (1986) cited in Gujarati, (2004) asserted that testing for cointegration of the regression residual is imperative condition since it is a pre test to avoid the possibility of producing spurious regression output. This study has taken into consideration the statement above.

3.1 Modeling Export Supply Function on Cloves

Modeling of cloves export supply considered the demand conditions in importing countries as given and this is similar to Ahmed, (2000). As such cloves' export supply from Tanzania its demand is infinitely price elastic. Regarding to infinitely elasticity of price, we estimated a single equation export supply function for cloves. Export trade modeling in our study followed the imperfect substitute model, in which the key assumption is that neither export nor imports are perfect substitutes for domestic goods particularly agricultural crops. This idea is borrowed from Ahmed's paper conducted in Bangladesh. Cloves export supply function reflected the assumption of profit maximization of producers. Our modeling estimate the price elasticity of cloves export since it depicts the degree of responsiveness of country's export earnings of crop exports to the relative export price from 1970 to 2010. Sources of data are from FAO STAT, World Economic Indicators and Ivan Kushnir's Research Center.

The main variables included in the model are cloves export earnings as dependent variable and independent variables are world price, real exchange rate and dummy variable so as to capture the effect before and after trade liberalization. World price is key determinant of export earnings or volume of any countries. It is expected that as world price increases the export earnings or volume of exporters will increase and vice versa is true.

Also Real Exchange Rate (RER) also is an explanatory variable in this model, real exchange rate obtained by multiplying the nominal exchange rate with the ratio of Tanzanian consumer price index (CPI) and USA consumer price index (CPI). Real exchange rate in this model is the measure of export competitiveness. We assume that as country depreciate her currency, other factor remains constant more quantity output will be exported as such trade liberalization is likely to depreciate real exchange rate of a particular country.

Dummy variable is included in the model to capture the distinction (if any) before and after trade liberalization periods from 1970 to 2010. Value of zero will be given for the period before trade liberalization and value of one after trade liberalization.

The long run cloves export supply function is specified as follows:

$$\ln X_t = \alpha_0 + \alpha_1 \ln WP_t + \alpha_2 \ln RER_t + \alpha_3 D_t + u_t \quad (1)$$

Where X is cloves export earnings, WP is cloves world price, RER is real exchange rate, D is dummy variable with values of 0 for 1970-1985 and 1 for 1986 -2010, U is random disturbance term with its normal classical

properties and Ln is natural logarithm. It is expected that $\alpha_2 < 0$ and $(\alpha_1 \text{ and } \alpha_3) > 0$.

If these time series variables of Lnxt, LnWPt and LnRERt found to be unit roots, then the study required to take the first difference of the variables (as in equation (2)) in order to obtain a stationary series:

$$\Delta \text{Ln}X_t = \alpha_0 + \alpha_1 \Delta \text{Ln}WP_t + \alpha_2 \Delta \text{Ln}RER_t + \alpha_3 D_t + u_t \quad (2)$$

Equation (2) above does not have any inference to long run aspects of decision making due to fact that, this process of differencing equation (1) results in a loss of valuable long run information in the data (Maddala, 1992 in Ahmed, 2000). In dealing with loss of valuable information the theory of cointegration came into place so as to mitigate the problem. The theory of cointegration addresses this issue by introducing an error correction (EC) term in the model. The Error- correction term (ECt) lagged one period (ECt-1) so as to integrates short run dynamics in the long run cloves export supply function is instituted. As such we specified a general error correction model (ECM) follows:

$$\Delta \text{Ln}X_t = \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta \text{Ln}WP_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta \text{Ln}RER_{t-i} + \beta_3 EC_{t-1} + \beta_4 D_t + \varepsilon_t \quad (3)$$

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.

3.2 Trend Analysis

The study examined the trend analysis of cloves export earnings. In order to capture the intended goal we formulated linear trend analysis model in which we regress cloves export earnings (X) in natural log on time. Such a model is called a linear trend model and the time variable t is known as the trend variable. Gurajati, (2004:180-181) provided the decision criteria as follows: if the slope coefficient in model is positive, there is an upward trend on export earnings, where as if it is negative, then there is a downward trend on export earnings on the variable (crop) under study.

We employed the following model so as determine the trend analysis of cloves export earnings from 1970 to 2010.

$$\text{Ln}X_t = \beta_0 + \beta_1 T + U_t \quad (4)$$

Where X_t is cloves 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 if there are upwards trend and vice versa is true.

3.3 Non-parametric test

In order to ascertain the obtained dummy variable coefficient in the model's above, also we employ Median test so as to see if trade liberalization in Tanzania has significant impact on cloves export earnings before and after adaptation of new trade policy. Assumption is that the populations from which two samples have been drawn have the same median. Median test does not require the two samples to be equal after being divided as such this study finds it convenient to use in our sample of 41 observations. The division was made as follows; sample one before trade liberalization 16 observations and sample two after trade liberalization 25 observations. We divided our sample into two sub samples that are before and after trade liberalization.

We estimated median values of both samples combined together, and we determined for each group the sample the frequencies of scores above or below the median. Thereafter, we presented the scores in 2X2 contingency table and compute the chi-squared of the contingency table. Decision criteria are that if the computed chi-squared value is greater than the critical table value, we reject null hypothesis of the sample having same median and vice versa is true.

We employ the following formula:

$$\chi^2 = \Sigma (F_o - F_e) / F_e \quad (5)$$

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

4. Empirical Analysis

4.1 Unit root test

The study performed unit root tests at levels of all the three variables which are cloves export earnings, world price and real exchange rate but all these variables were in natural logarithms. Also we estimated those variables in first difference to see if variables are stationary at first difference. We 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 since the computed absolute value of tau statistic does not exceeds 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.

In order to ascertain the results above also the study employed graphical presentation to test for unit root and stationarity amongst the variables. The graphs also supported the non-stationarity for mentioned variables at level see figure 1 to 3 in appendix as well as variables are stationary at first difference, see figure 4 to 6 in appendix respectively.

4.2 Cointegration Test

In estimating the cointegration tests, the study employed various techniques like Johansen and Juselius (1990), Engle-Granger (EG) test and Cointegrating Regression Durbin-Watson (CRDW) test so as to ascertain if the variables are cointegrated. Under Johansen and Juselius (JJ) (1990) we specified the relevant order of lags (p) of the VAR model similar to Pesaran and Pesaran, 1997 in Ahmend (2000). Insert table 7. Trace test indicates the existence of one cointegrating variables at the 5 percent level while Maximum Eigenvalue test indicates no cointegration at 5 percent level. Therefore, there is one cointegration amongst these two variables.

Engle-Granger test employed similar procedure as in unit root test but under cointegration test we estimate cointegrating regression residual and we use the Augmented Dickey-Fuller tests. Decision rule state 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 accept the alternative hypothesis of stationary (Gujarati, 2004). The computed absolute value of the tau statistic (0.000450) exceeds the Engle – Granger critical tau values (-2.5899) at 1percent level, then we rejected the null hypothesis means that residual is stationary implies that variables are cointegrated. See table 8 in appendix.

Testing cointegration under Cointegrating Regression Durbin-Watson (CRDW) test, the results reveal that the computed durbin (d) value (1.628821) is greater than the critical values (0.511) and (0.386) at 1percent level and at 5 percent level respectively (Gujarati, 2004:824) as such we do not reject null hypothesis of cointegration amongst the variables. Therefore the variables are cointegrated. Refer table 9 in appendix.

4.3 Estimation of long run relationship

Having established that the residual of the regression in equation one (1) is stationary, so the variables are cointegrated as such the regression output obtained in equation (1) at level are not spurious (Granger and Engle, 1987, Gujarati, 2004:822 and Utkulu, 2012). If we regress the dependent variable on independent variables where residuals of the variables are non-stationary, then the results are likely to be spurious. Therefore the importance of testing for unit root and cointegration help us to find out if the regression residuals are stationary. If the residuals are stationary then the regression of variables at level will be not spurious as a case in our equation one (1) since the residuals of our regression at level are stationary then variables are cointegrated, so our results are not spurious as such are meaningful (Granger and Engle, 1987, Gujarati, 2004:822 and Utkulu, 2012).

The empirical results obtained representing long run relationship amongst the variables. All the variables found with expected signs see table 9. World price found with an expected sign which positive (0.897851) and statistically significant at 5 percent level which means that world price is significant determinant of clove export in Tanzania. This implies that one percent increase in world price increases clove export for 89.7 percent and this result is similar with other studies like Abolagba, et al. (2010) and Amoro, G & Shen, Y. (2012). Similarly, real exchange rate as measure of competitiveness found with negative sign as it was expected (-0.058406) but statistically insignificant. This signifies that devaluing domestic currency (Tzs) by one percent increases the cloves export for 5.84 percent. This result is in same vein with Diakosavvas and Kirkpatric (1990), McKay et al. (1997), and Folawewo and Olakojo (2010) where the devaluation of currencies was insignificant in the countries under study. Reasons behind were the impact of devaluation of currencies did not reach the farmers directly due to fact that the marketing board of the country they bought farmer's crops for lower prices as well as the production of agricultural products like perennial crops by its nature cannot respond immediately to changes in devaluation of currencies compared to the industrial goods. Also devaluation of currencies per see without improving productivity capacity cannot be significant on export of agricultural crops.

Dummy variable which captured the effect of trade liberalization before and after found with expected sign which is positive (0.309422) but statistically insignificant, similar to Folawewo and Olakojo (2010). Dummy variable coefficient signifies that there 31 percent increase on cloves export earnings before and trade liberation. In particular, empirical results shows that the agricultural export (cloves) tend to rise as the policy changed that

is from non- liberalized trade to liberalized trade in Tanzania. All in all, trade liberalization strategy in Tanzania found to have positive contribution on clove export earnings. These variables in the model generally explained the clove export earnings for 87.2 percent according to adjusted R-squared obtained and the rest of the percentage can be determined by other variables which are not included in this model. Insert table 9 below.

4.4 Estimation of an error-correction model (ECM)

Once a cointegration relationship amongst the variables established, the study estimated an error-correction model (ECM) so as to determine the speed of adjustment of short run dynamics behavior to the long run equilibrium of clove export. The greater the coefficient of the error-correcting term, signify that the model is adjusting faster from the short run to the long run equilibrium. In this model, world price, real exchange rate and dummy variable have emerged as significant determinants of cloves export supply. The error –correction coefficient, estimated found with expected sign which is negative (-0.780015) and it is statistically significant at 5% level similar to Ahmed, (2000) and this suggests a high speed of convergence to equilibrium. This means that variables adjusting to equilibrium at the speed of 78 percent per annum. World price in short run found with a positive sign (0.732093) and statistically significant. This implies that world price is main determinant of cloves export earnings in Tanzania. Real exchange rate was found to be positively affecting cloves export but it is statically insignificant and it is in line with Diakosavvas and Kirkpatric (1990) results, this means that even in short run real exchange rate is still important determinant of cloves export supply in Tanzania though it is marginally. Dummy variable also found with a positive sign means that even in short run trade policy is important but it is statistically insignificant as in long run similar to Folawewo and Olakojo (2010). The diagnostic test statistics show no evidence of misspecification, no problem of normality, no any problem of serial correlation and no problem of heteroscedasticity. The Durbin-Watson statistic value of 1.978532 against the R^2 value of 0.455257 implies that model is reliable in explaining cloves export earnings in Tanzania. See table 10 below.

4.5 Trend analysis

Having examined that variables are cointegrated means that they have long run relationship and they have been found to be significant determinants of cloves export supply in Tanzania over the period understudy, we estimated the trend analysis so as to see if the cloves export earnings is improving or not. In Linear trend analysis model we regress cloves export earnings (X_t) on time. Decision criteria is that, if the slope coefficient in model is positive, there is an upward trend on cloves export earnings, where as if it is negative, there is a downward trend on cloves export earnings (Gurajati, 2004:180-181). The empirical results reveal that clove export earnings are improving since the trend coefficient is positive (0.792319) and it is statistically significant at 5 percent level. Insert table 11. Therefore, under trend analysis cloves export earnings are moving upwards rather moving downwards as such the government should take care on cloves as important source of foreign currencies in Tanzania.

4.6 Median test

The empirical results from median test shows that trade liberalization has significant impact on clove export earnings in Tanzania since the computed chi-squared value (12.46) was greater than critical table value (3.84) at 5 percent level in one degree of freedom. So we rejected the null hypothesis of sample having the same median and favored the alternative, for that matter trade policy is significant in Tanzania. Insert table 12.

5. Concluding remarks

In our empirical investigation of the cloves export earnings for Tanzania, we employ parametric and non parametric techniques. Parametric techniques includes cointegration and error correction modeling approaches as well as trend analysis whereas nonparametric technique we employ median test. Under error correction modeling we find a unique equilibrium relationship amongst the variables which are clove export earnings, World price and real exchange rate (RER). In this study in order to determine short run dynamics around the equilibrium relationship, we estimated an error correction model (ECM). In the model cloves export earnings, World Price ,Real Exchange Rate (RER) and dummy variable which capturing the effect of trade liberalization strategy in Tanzania, all have emerged as important determinants of the short term dynamics of the clove 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. This implies that variables adjusting to equilibrium at the speed of 78 percent per annum as such confirming the validity of the long run equilibrium relationship. The coefficient estimate of the error correction term in this model is (-0.780015) and this indicating a high speed of adjustment of variables to equilibrium.

Our empirical estimates of the cloves export earnings found with a high negative elasticity in the export earnings to the export-weighted Real Exchange Rate (RER) (-0.0584406). This result indicates an increase in Tanzanian export competitiveness on cloves and in other crops as well. This is consistent with the fact that the Tanzania shillings were depreciated tremendously after trade liberalization particularly from 1986 onwards.

The coefficient of the dummy variable used in this model represented the trade regime shift in Tanzania. The coefficient found with expected sign that is positive (0.309422). This result provides statistical support for the view that, apart from its impact on other variables under study like world price and real exchange rate, trade liberalization policy package has been instrumental in creating a conducive environment for export expansion in many developing countries and Tanzania being among. However, the coefficient estimate of the dummy variable is insignificant in this model. This result was expected in Tanzania, where the liberalization policies on agricultural sector were implemented gradually especially in those cash crops which accounted large portion of foreign currencies in the economy. Apart from gradual pace but also trade liberalization cannot be fully effective up until various structural bottlenecks like government intervention is dealt seriously so as to allow export expansion on agricultural cash crops in Tanzania.

The policy implications of this paper are obvious. For Tanzanian export sector to achieve rapid expansion of exports in their agricultural products cloves export in particular; trade liberalization policies should be associated with depreciation of domestic currency (Tanzanian shillings) though with extra careful. The logic behind is that a real exchange rate based trade liberalization policy will facilitate the reduction of the anti-export bias in Trade. The findings also point out the need for reducing government intervention as well as liberalizing agricultural sector to the required level.

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Appendices

Table 1: Unit root test at level in LnExport

Null Hypothesis: LNEXPORT has a unit root

Exogenous: Constant

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

	t-Statistic
Augmented Dickey-Fuller test statistic	-1.540507
Test critical values:	
1% level	-3.605593
5% level	-2.936942
10% level	-2.606857

*MacKinnon (1996) one-sided p-values.

Table 2: Unit root test at level in LnWP

Null Hypothesis: LNWP has a unit root

Exogenous: Constant

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

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.751677	0.8217
Test critical values:		
1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

*MacKinnon (1996) one-sided p-values.

Table 3: Unit root test at level in LnRER

Null Hypothesis: LNRER has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.032844	0.7319
Test critical values:		
1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Unit root test at first difference

Table 4: Unit root test at first difference in D(LNEXPORT)

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	-8.697599	0.0000
Test critical values:		
1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Table 5: Unit root test at first difference in D(LNWP)

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

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.452182	0.0000
Test critical values:		
1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Table 6: Unit root test at first difference in D(LNRER)

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	

*MacKinnon (1996) one-sided p-values.

Cointegration test

Table 7: Johansen and Juselius (JJ) (1990)

Date: 12/19/13 Time: 08:07

Sample (adjusted): 1972 2010

Included observations: 39 after adjustments

Trend assumption: No deterministic trend (restricted constant)

Series: LNEXPORT LNWP LNRER

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.387611	36.40530	35.19275	0.0368
At most 1	0.288853	17.28022	20.26184	0.1224
At most 2	0.097157	3.986041	9.164546	0.4142

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	0.387611	19.12509	22.29962	0.1310
At most 1	0.288853	13.29418	15.89210	0.1227
At most 2	0.097157	3.986041	9.164546	0.4142

Max-eigenvalue test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

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

Engle-Granger cointegration test

Table 8: Engle-Granger cointegration test

Dependent Variable: DRES
 Method: Least Squares
 Date: 12/19/13 Time: 08:22
 Sample (adjusted): 1972 2010
 Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SER01	0.000450	0.007879	0.057164	0.9547
R-squared	0.000015	Mean dependent var		0.009736
Adjusted R-squared	0.000015	S.D. dependent var		1.172389
S.E. of regression	1.172380	Akaike info criterion		3.181256
Sum squared resid	52.23008	Schwarz criterion		3.223911
Log likelihood	-61.03449	Durbin-Watson stat		2.606599

Long run coefficient

Table 9: Long run coefficient

Dependent Variable: LNEXPORT
 Method: Least Squares
 Date: 12/18/13 Time: 17:00
 Sample: 1970 2010
 Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.687499	1.254933	7.719537	0.0000
LNWP	0.897851	0.131180	6.844405	0.0000
LNRER	-0.058406	0.125697	-0.464659	0.6449
DUMMY	0.309422	0.576078	0.537118	0.5944
R-squared	0.882273	Mean dependent var		20.98127
Adjusted R-squared	0.872727	S.D. dependent var		1.850451
S.E. of regression	0.660154	Akaike info criterion		2.099779
Sum squared resid	16.12470	Schwarz criterion		2.266957
Log likelihood	-39.04547	F-statistic		92.42871
Durbin-Watson stat	1.628821	Prob(F-statistic)		0.000000

Error correction model (ECM) coefficient

Table 10: Error correction model (ECM)

Dependent Variable: DLNEXPORT

Method: Least Squares

Date: 12/18/13 Time: 18:15

Sample (adjusted): 1971 2010

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNWP	0.732093	0.244436	2.995025	0.0049
DLNRER	0.086776	0.148666	0.583699	0.5631
ECt-1	-0.780015	0.169919	-4.590519	0.0001
DUMMY	0.028463	0.136667	0.208268	0.8362
R-squared	0.455257	Mean dependent var		0.114562
Adjusted R-squared	0.409861	S.D. dependent var		0.842111
S.E. of regression	0.646914	Akaike info criterion		2.061431
Sum squared resid	15.06590	Schwarz criterion		2.230319
Log likelihood	-37.22863	Durbin-Watson stat		1.978532

Trend analysis

Table 11: Trend analysis of Lnexport on Time

Dependent Variable: LNEXPORT

Method: Least Squares

Date: 12/17/13 Time: 16:05

Sample: 1970 2010

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TREND	0.792319	0.058237	13.60506	0.0000
R-squared	-22.594167	Mean dependent var		20.98127
Adjusted R-squared	-22.594167	S.D. dependent var		1.850451
S.E. of regression	8.988348	Akaike info criterion		7.253823
Sum squared resid	3231.616	Schwarz criterion		7.295618
Log likelihood	-147.7034	Durbin-Watson stat		0.014244

Non-parametric approach

Table 12: Median test

Contingency table

SAMPLE	I	II	TOTAL
ABOVE MEDIAN	0	5	5
BELOW MEDIAN	16	20	36
TOTAL	16	25	41

Expected value

1.95	3.05
14.05	21.95

$16 \cdot 5 / 41$

$\chi^2 = 12.46$

FIGURES

Non stationary graphs at level

Figure 1: Cloves Export earnings

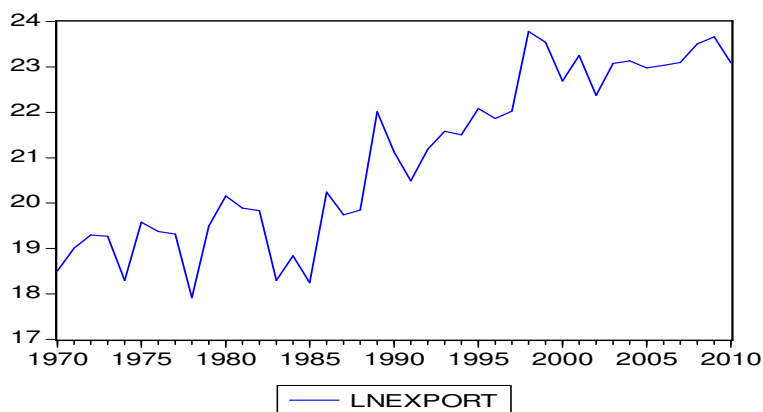


Figure 2: World price

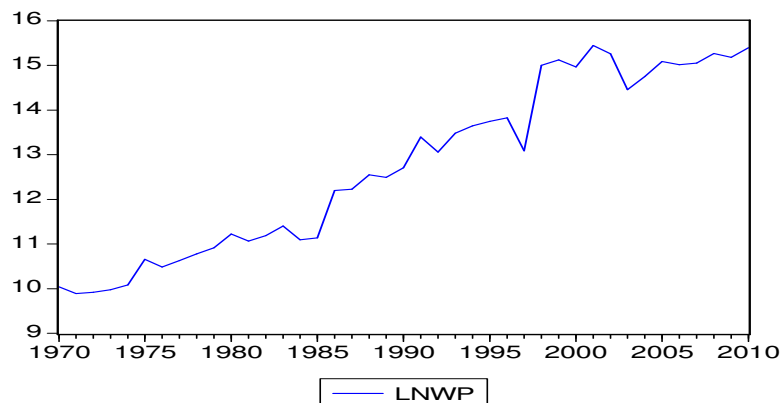
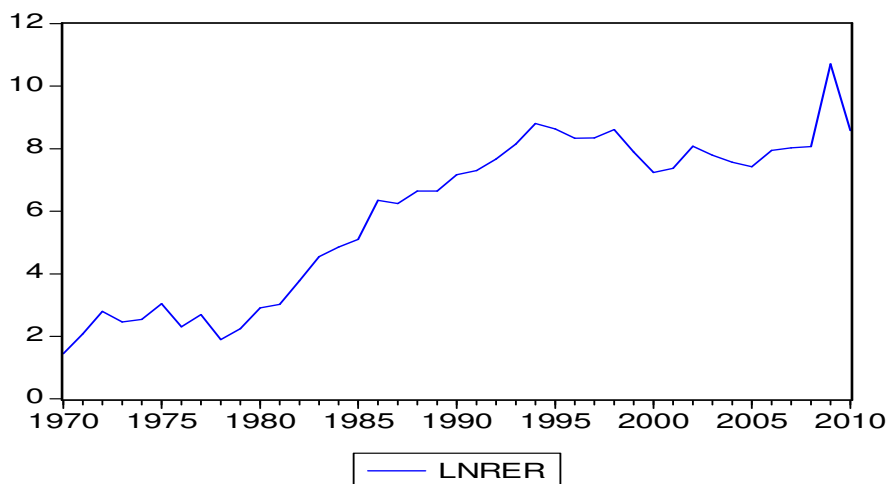


Figure 3: Real exchange rate



Stationary graphs at first difference

Figure 4: Cloves Export earnings

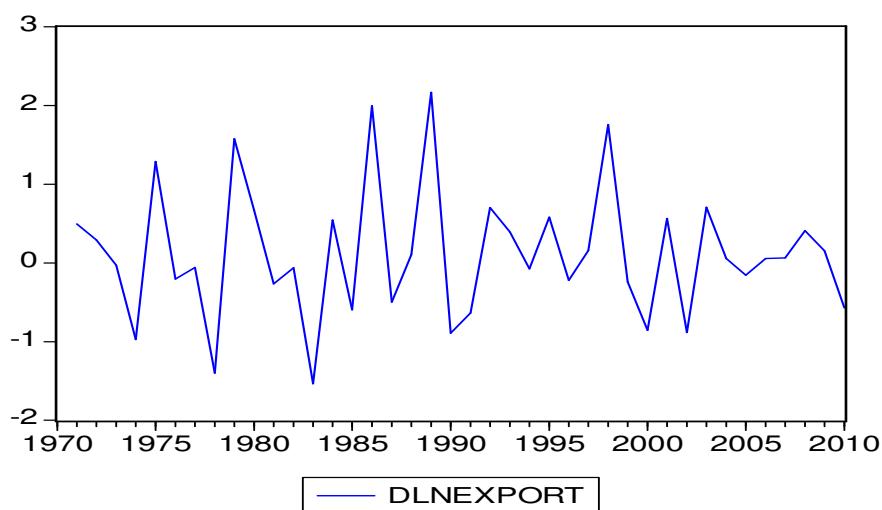


Figure 5: World price

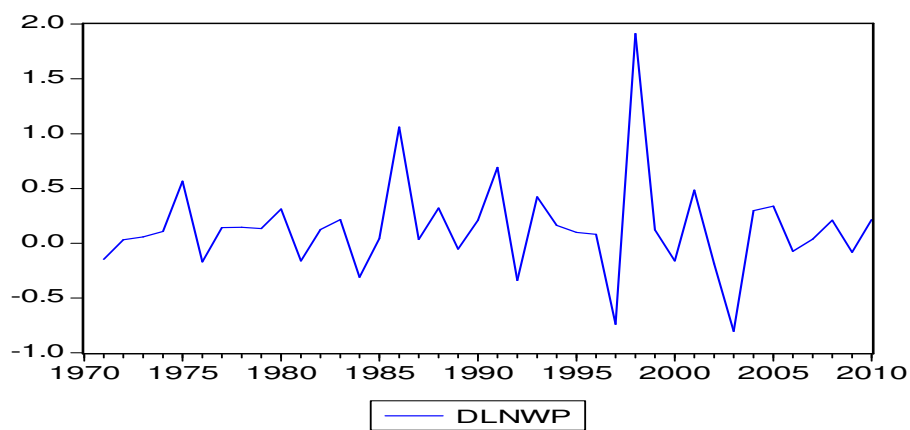
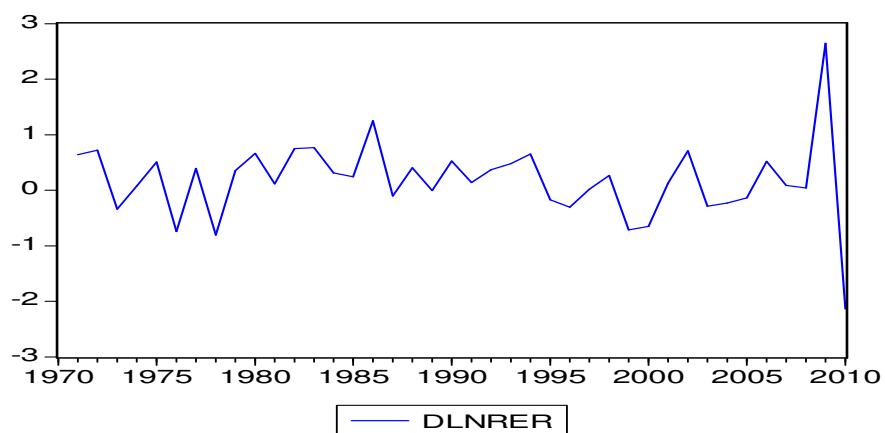


Figure 6: Real exchange rate



Abbreviation

URT the United Republic of Tanzania