

# Export Trade and Economic Growth in Tanzania: *A Disaggregated Approach*

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## Abstract

This paper applies the Vector Autoregressive (VAR) technique to annual data from 1980 to 2009 to provide empirical evidence on the long-run relationship between exports trade and economic growth in Tanzania. The exports trade in this study is disaggregated into services and goods exports. Thus, the paper estimated two models. The first model deals with the relationship between export of services and growth, and the other one determines the relationship between goods export and growth. While the paper find no evidence for long-run relationship between export of goods and growth, our empirical results suggest existence of a long-run nexus between export of services and economic growth in Tanzania. The Granger causality test results have also confirmed existence of a unilateral causality from economic growth to service exports.

**Keywords:** Export Trade; Economic Growth; Cointegration; Granger Causality.

## 1. Introduction

Export trade is believed to play crucial role in promoting economic growth for both developed and developing countries. It is an important source of foreign exchange that relieves the balance of payments pressure and creation of employment opportunities. Export trade also eases the process of technology transfer between nations. Moreover, the export trade provides incentives to local firms to expand their capacity of producing goods and services that can compete in the world market (Yaghaian, 1994; Giles and Williamson, 2000). It increases the inter-industry linkage that enables the domestic economy to integrate and thus reduce the risk of external shocks.

The impact of export trade on economic growth has been a topic of intense discussion in both empirical and theoretical studies. Most studies have discusses this aspect on the framework of export-led growth hypothesis. Despite the enormous number of studies, controversy still exists on whether export trade stimulates economic growth of underdeveloped countries. Some studies argue that exports promote economic growth by stimulating external demand for domestic products, and that result into increase in total factor productivity of domestic firms (e.g. Esfahani, 2001; Lawrence et al., 1999; Helpman and Krugman, 1985). Indeed, the empirical evidence reveals that export expansion and trade openness are the key factor for higher economic growth because of their positive externalities to trading partners. Yu (1998) argues that export-oriented strategy is very important in promoting economic growth while import trade regime may harm the domestic firms thereby distorting the overall economic performance. Similarly, Bernard and Jensen (1999) observed that the exporters in the manufacturing sectors grow faster as compared to non-exporters, claiming that their growth is through reallocation of resources from their less efficient to more efficient productive activities.

In general, there is consensus that that export trade increases the total factor productivity (TFP) in developing countries. However, study by Coe and Helpman (1995) attest that the impact of export trade on TFP depends on R&D capital stock and R&D stock of the trading partners. Some other studies have indeed gone to the extent of condemning international trade flows as being among the factors that contribute to poor economic performance in developing countries. The main reason given is that it tends to kill the domestic infant firms since, as these firms cannot compete with international producers in the world market. These studies have suggested the adoption of import substitution strategies to counter this problem (Krugman and Venables, 1995; Rodrigues, 2010).

Despite of mixed results on the empirical linkage between export trade and economic growth, only few studies have applied the disaggregated approach to study the relationship between exports and growth. In this study, we disaggregate exports into services and goods export to determine their potential role in stimulating economic growth of Tanzania. This paper therefore, applies the Vector Autoregressive (VAR) approach to annual data from 1980 to 2010 to provide empirical evidence on the long run relationship export and economic

growth in Tanzania. The results suggest the existence of long-run relationship between export of services and economic growth. The results also indicate the absence of any long-run relationship between export of goods and growth. Moreover, the granger causality test reveals the evidence for unidirectional causality from growth to services exports.

The rest of the paper is organized as follows. Section two contains review on the export-growth literature; section three presents the econometric model and methodology; section four presents the empirical findings of the study; and section five presents the summary and conclusion.

## 2. Review of Literature

The theoretical relationship between export trade and economic growth has long been established in the classical economic theory originated from Adam Smith and David Ricardo. In this theory, Smith and Ricardo argued that international trade plays important role in promoting economic growth of the nations. Later on, it was recognized from the theory that export trade is important for generating foreign exchanges that are needed for importation of goods that cannot be domestically produced. In modern economic arena, the export-growth relationship is described in the framework of export-led growth hypothesis. The paradigm gained more attention after success story of East Asian export-led growth strategies adopted during the period of 1970s and 1980s. The export-led growth hypothesis became especially popular after the failure of import substitution strategy implemented by most African and Latin American countries. In this section, we provide the brief review of literature on the growth impact of export trade in developing countries.

Supporters of export-led growth hypothesis assert that, export trade is important engine of growth because it increases the TFP of local firms resulted from increased economies of scale. They also argue that export trade plays crucial role in transfer of technology, improving managerial skills and skills of workers, and increasing the productive capacity of domestic economy (see for example Rivera-Batiz and Romer, 1991; Grossman and Helpman, 1990). This enables economic agents to allocate economic resources in their most efficient sectors reflecting the true idea of opportunity cost. A number of empirical studies support the export-led growth hypothesis. These studies divided into cross-country and individual country studies. The cross-country studies include that of Ngoc, Phuong Anh and Nga, 2003; Edwards, 1992; Lopez, 1991; Ram 1985). Most of these studies support the existence of positive association between exports and economic growth. Studies based on single country analysis, are in most cases financed by international organization and thus usually tend to support the export roles in promoting growth.

Several factors have been identified to be associated with positive role of exports on economic growth. One of these factors is its positive impact on economies of scale, capacity utilization, productivity gains, and enhancing the greater variety of products (Khalifa Al-Youssif, 1997; Levin and Raut, 1997). It is also argued that export trade provides an opportunity for local firms to compete in the world markets and enhance technology transfer and improvement of managerial skills. The recent study by Gunter, Taylor, and Yeldan (2005), found the evidence supports the above arguments. Their evidence suggests that any gain from the liberalized trade is often associated with external effects that are dynamic in nature.

The past empirical studies have significantly differed in terms of statistical approaches used for data analysis. The methods applied divided into three main categories. The analyses based on correlation between exports and growth; using the aggregate production framework with export as independent variable; and the analyses based on finding the existence of threshold effects (Sharma and Panagiotidis, 2005). The econometrics methods applied by most studies are time series dominated by Granger (1988), Engle and Granger (1987), Johansen (1988), Johansen, and Juselius (1990). Studies based on cross-country analysis have extensively applied the panel data techniques such as pooled OLS, random effects, fixed effects estimation methods. However, most of these studies have used the aggregated approach to evaluate the role of export trade on economic growth. In this study, the attempt has been made to disaggregate exports into export of goods and export of services to compare the relative importance of each category in promoting growth. Thus, the study employs the VAR approach accompanied by impulse response function and variance decomposition techniques to test the robustness of the VAR and Granger causality results.

## 3. Econometric model and methodology

Following Oxley (1993), Thornton (1996), and Ukpolo (1998), the export-led growth model can be expressed in the form of bivariate linear model as here under:

$$RGDPC_t = \alpha_0 + \alpha_1 REX_t + \varepsilon_t \quad (1)$$

where  $RGDPC_t$  represents the level of real per capita GDP at time  $t$  and  $REX_t$  measures, the level of real exports at time  $t$ .  $\varepsilon_t$  is the error term at time  $t$  which is assumed to fulfill the assumption classical linear regression model.

As have been noted earlier, the focus of this paper is to investigate the empirical link between economic growth and export trade in Tanzania. The study employs the Vector Autoregressive (VAR) technique to annual data from 1970 to 2009. In applying mentioned economic method, we adopt the Van Den Berg (1997) model that used to determine the empirical link between trade and economic growth in Mexico. In this work, Van Den Berg explained VAR as useful techniques because it enables us to examine the possible “causal relationship” (using Granger Causality test) between the variables.

The service exports and goods exports are disaggregated from total export to perform analysis on the relative importance of each category in accelerating economic growth in Tanzania. The analysis is also extended to impulse response function (IRF) and variance decomposition to test the impact of service exports and goods exports on economic growth. These techniques are also useful for determining the relative importance of each category of exports in simulating the economic growth. To accommodate our investigation,  $REXSer_t$  and  $REXGd_t$ , replaced  $REX_t$  in the equation (1), whereby  $REXSer_t$  is service exports and  $REXGd_t$  is good exports. We also estimated the relationship between economic growth and  $REXSer_t$  and  $REXGd_t$  in two separate models. The models are presented as follows:

$$RGDPC_t = \beta_0 + \beta_1 REXSer_t + v_t \quad (2)$$

$$RGDPC_t = \gamma_0 + \gamma_1 REXGd_t + u_t \quad (3)$$

where  $v_t$  and  $u_t$  is error term.

The variable  $RGDP_t$  represents the annual real per capita GDP.  $REXSer_t$  is the ratio of real value of exports of services to GDP, and  $REXGd_t$  is the ratio of real value of exports of goods to GDP. Measures of all these variables are taken from United Nations Conference for Trade and Development (UNCTAD) statistical database. The sample period under investigate begins from 1980 to 2009. All data are transformed into natural log to facilitate analysis.

The analysis began with testing the stationarity of each series. To test for the presence of co-integrating between the series, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were performed to examine the degree of integration of the series. In the case where the two series were integrated in order one, i.e.  $I(1)$ <sup>1</sup>, the VAR model can be constructed in level or first difference. This reduces the possibility of identifying ‘spurious causality’ (Oxley, 1993; Thornton, 1996). It has been shown that many macroeconomic series are non-stationary at level and this can lead to spurious results if OLS technique is applied. Once the series are made stationary by appropriately differencing them, they can be used for regression analysis. The drawback of this method is the possibility of losing the long-run information that may present in variables. This problem can be overcome by applying the co-integration technique, which shows the long-run relationship between the non-stationary series (Mallik, 2008). We then determine the existence of long-run co-integration in the series by applying the Johansen test for co-integration. Johansen (1988); Johansen-Juselius (1990) had proposed two likelihood tests for data involving two distinct series. The variables are only co-integrated if and only if a single co-integrating equation exists<sup>2</sup>. The purpose of Johansen test is to determine the number of co-integrating vectors that exist in is the system.

Engle and Granger (1987) indicated that if two series are co-integrated, there must be an error correction representation. Conversely, if there is an error correction representation, the two series must be co-integrated. Moreover, if a co-integration relationship exists between two series, there is at least a causal effect running from one variable to another. However, the co-integration tests do not indicate the direction of causal effect. In the case of co-integration, the Error Correction Models (ECM) can appropriately be used to examine the long-run relationship especially in the VAR system. ECM combines the short-run and long run effects in a single test. This allows us to draw more general conclusion by running the VAR in levels and computing tests for Granger non-causality on each variable block. The Granger causality test can simply be represented by the following regression equation:

<sup>1</sup> Engle and Granger (1987) show that if two series are integrated  $I(1)$ , Granger causality must exist in at least one direction in, at least, the  $I(0)$  variables.

<sup>2</sup> According to Granger (1988), if the variable in a system are co-integrated, then the causal analysis needs to incorporate the error correction term for the adjustments of deviation from its long run equilibrium and avoid misspecification of model.

Model 1: Service Exports

$$dRGDPC_t = \pi_0 + \sum_{i=1}^t \pi_{1i} dRGDPC_{t-i} + \sum_{i=1}^t \pi_{2i} dREXSer_{t-i} + \theta_1 ECT_{t-1} + \phi_t \quad (4)$$

$$dREXSer_t = \delta_0 + \sum_{i=1}^t \delta_{1i} dREXSer_{t-i} + \sum_{i=1}^t \delta_{2i} dGDPC_{t-i} + \theta_2 ECT_{t-1} + \varphi_t \quad (5)$$

Model 2: Goods Exports

$$dRGDPC_t = \tau_0 + \sum_{i=1}^t \tau_{1i} dRGDPC_{t-i} + \sum_{i=1}^t \tau_{2i} dREXGd_{t-i} + \theta_3 ECT_{t-1} + \eta_t \quad (6)$$

$$dREXGd_t = \mu_0 + \sum_{i=1}^t \mu_{1i} dREXGd_{t-i} + \sum_{i=1}^t \mu_{2i} dRGDPC_{t-i} + \theta_4 ECT_{t-1} + \psi_t \quad (7)$$

where all series are in the first difference,  $\phi_t, \varphi_t, \eta_t, \psi_t$ , represent the error terms.

We use IRF to track the impact of shocks from economic growth to service exports and vice versa. IRF shows how the variable responds to the shocks of other variable. It also indicates for how long the shocks in one variable will persist or continue to affect other variable. It is an essential tool in empirical causal analysis and policy effectiveness analysis. On the other hand, variance decomposition is used to show how important the change in one variable is due to change in another variable. That enables us to see the extent to which changes or shocks in one variable are important in determining the changes or shocks in other variable.

**4. Empirical Results**

The unit root tests results are presented in Table 1 below. The ADF and PP tests have confirmed that all variables are non-stationary at level. However, after taking their first difference, the results show that the series became stationary. In other words, all series under the study, are integrated at order one, i.e.  $I(1)$ .

**Table 1: Unit Root Tests**

Variables <sup>3</sup>	Level		First Difference	
	ADF	PP	ADF	PP
LNRGDPC <sub>t</sub>	-0.7937	-0.7937	-5.1963***	-5.2072***
LNREXSER <sub>t</sub>	-2.1768	-3.2076	-4.4115***	-4.0955**
LNREXGD <sub>t</sub>	-1.7508	-1.7508	-5.3138***	-5.3130***

Note: \* means significance at 10% level, \*\* means significance at 5% level, \*\*\* means significance at 1% level.

Tests were conducted for the series with both intercept and trend.

After detecting that all series are  $I(1)$ , we applied Johansen's maximum likelihood estimation (Johansen's MLE) test for co-integration to test the existence of long-run relationship among the non-stationary variables. Table 2 presents the results for the co-integration tests. The co-integration test was applied to equation (2) and equation (3) separately. The Johansen's MLE test results for equation (2) - that intends to investigate the long-run relationship between economic growth and export of services, indicate the existence of at least one co-integrating vector at 95% confidence level. The existence of co-integrating vector implies the presence of long-run relationship between economic growth and service exports in Tanzania. These results are consistent with Guerrieri et al., (2005) who attested that service exports can play a greater role in enhancing economic growth. The role of service export is described by its importance in technological diffusion as most of services based

<sup>3</sup> LNRGDPC<sub>t</sub> represents natural logarithms for RGDPC<sub>t</sub>, LNREXSER<sub>t</sub> represents the natural logarithms for REXSer<sub>t</sub> and LNREXGD<sub>t</sub> represents natural logarithms for REXGd<sub>t</sub>.

exports such as financial, consultancy, transport, legal, computing and processing services, are said to be knowledge intensive. In fact, most of modern services are more technology and knowledge intensive than generally considered (Tomlinson, 2001).

For the case of equation (3), both maximum Eigen value and trace statistics fail to reject the null hypothesis of no co-integrating vector between the variables at 95% confidence level. Thus, it can be concluded that there is not long-run relationship between goods export and economic growth in Tanzania. This also implies that any search for causality for equation (3), is unwarranted and thus, can lead to misleading inferences<sup>4</sup>.

**Table 2: Co-integration Tests<sup>5</sup>**

Null Hypothesis	LNRGDPC <sub>t</sub> and LNREXSER <sub>t</sub>		LNRGDPC <sub>t</sub> and LNREXGD <sub>t</sub>	
	Test Statistics		Test Statistics	
	Trace	Max	Trace	Max
None	22.4373**	21.1082**	13.9528	13.6283
At most 1	1.3291	1.3291	0.3245	0.3245

Note: \*\* means significance at 5% level

Based on the co-integration results, we can ascertain that economic growth and services export are co-integrated, and therefore, are causally related. Table 3. below presents the results for the lagged residuals from the co-integrating regression (ECT<sub>t-1</sub>) and the Granger causality test structure. The negative sign of ECT<sub>t-1</sub> suggests that the economic determinant is endogenous and have long-run equilibrium<sup>6</sup>. The ECT<sub>t-1</sub> in the real GDP per capita equation has negative sign but the coefficient is not significant at all conventional significance levels. The results of Granger causality test suggest that the null hypothesis for equation (4) cannot be rejected. However, the hypothesis for equation (5) can be rejected and thus it is significant at 5% level. These results imply that for the case of Tanzania, the economic growth Granger-causes service exports during the period of study.

**Table 3: Vector Error Correction Model and Granger Causality Test**

	Khi-squared Statistics		ECT <sub>t-1</sub> [t-statistics]
	dLNRGDPC <sub>t</sub>	dLNREXSER <sub>t</sub>	
dLNRGDPC <sub>t</sub>	-	1.8742	-0.0032 [-0.2430]
dLNREXSER <sub>t</sub>	2.9052**	-	-0.2498** [-4.0218]

Note: \*\* means significance at 5% level

Figure 1 illustrates the results of IRF analysis of economic growth and service exports in the VAR system to one standard deviation of shock. When there are positive shocks to the economic growth, the services export is found to respond negatively but insignificant from the period one to the fourth period. Beyond the fourth period (i.e. year four), the negative effects of the shocks became significant until the eighth period. On the other hand, when there are positive shocks to service exports, the economic growth also shows significant negative responses. The effect begins contemporaneously and lasts after two periods beyond which, it becomes insignificant. The results imply that the sudden increase in economic growth rate and share of service export will contribute to the adverse effect to the other.

<sup>4</sup> Ahmad and Harnhirun (1995), pp 331.

<sup>5</sup> Johansen's MLE test for cointegration is sensitive to the lag length. Non-autocorrelation of error term was applied in the study to determine the lag length, and for both equation, the maximum lag in VAR is one (1).

<sup>6</sup> Tan and Lean (2010)

**Figure 1: Impulse Responses Function: the Response to Cholesky One Standard Deviation Innovations**

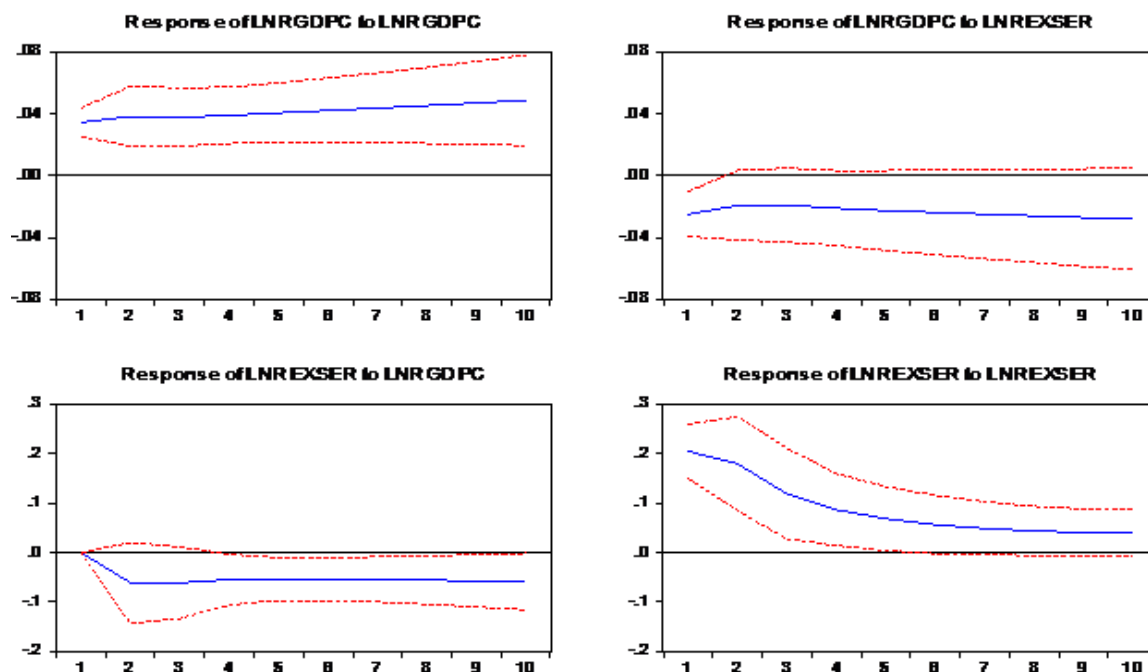


Table 4 and 5 display the results of variance decomposition analysis for economic growth and service exports respectively. The results show that shocks service exports have significant impact on economic growth in Tanzania. The impact of shocks starts contemporaneously and persistently throughout the ten periods under analysis. Furthermore, the results shows that the service exports shocks are independent of the shocks from economic growth until after the fourth period when economic growth shocks became significant. The direction of shocks is upward.

**Table 4: Variance Decomposition of  $LNRGDPC_t$**

Period	$LNRGDPC_t$	$LNREXSER_t$
1	65.6450	34.3550
2	72.8558	27.1442
3	75.0706	24.9294
4	75.6560	24.3441
5	75.7934	24.2066
6	75.7877	24.2123
7	75.7229	24.2771
8	75.6371	24.3629
9	75.5486	24.4514
10	75.4650	24.5350

**Table 5: Variance Decomposition of LNREXSER<sub>t</sub>**

Period	LNRGDPC <sub>t</sub>	LNREXSER <sub>t</sub>
1	0.0000	100.0000
2	4.8015	95.1985
3	7.7830	92.2170
4	9.8172	90.1829
5	11.6561	88.3439
6	13.4592	86.5408
7	15.2445	84.7555
8	17.0225	82.9775
9	18.8017	81.1983
10	20.5856	79.4144

## 5. Conclusion

This study makes an effort to examine the relationship between economic growth and export trade in Tanzania. The study employs the VAR technique to the annual data covering the period of 1970 to 2009. The disaggregated approach is used to study the role of export trade on economic growth. This led to formulation of two regression models; the service exports model, and the goods exports model. Impulse response function or innovation accounting techniques is also used to examine the manner through which the shock in one variable affects the others in both models. To glimpse the importance of the shock in one variable in affecting the other variable, the variance decomposition analysis was also performed.

The results suggest the existence of long-run relationship between export in services and economic growth. Our study also seems to support the notion that economic growth causes service exports. However, there is no evidence of causality running from service exports to economic growth. Therefore, our results have failed to support the export-led growth hypothesis for the case of Tanzania. For the case of relationship between goods exports and economic growth, the results rejected the hypothesis for existence of co-integration. Thus, we can conclude that, for the case of Tanzania, export of goods does not share any long-run relationship with economic growth.

The IRF analysis suggests that a sudden increase (positive shock) to economic growth has an adverse effect to the services export share. This also happened to economic growth rate when the share of services exports increase suddenly. These observations may imply that, under the study period, the economic growth rate and services export share have been at their equilibrium level. This may be due to the country's poor development of human and physical capital, which fail to support the higher economic growth rate or higher services export share. We therefore suggest that further study to be conducted to evaluate whether the current stage of development in human capital and physical capital in Tanzania has contributed to the phenomenon.

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